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ORGAN (Ὄργανον, Gr., *organum*, Lat., an instrument), the noblest of musical instruments, whether considered in regard to the grandeur and beauty of its sounds, the variety of its powers, or the sacred purposes to which it is usually dedicated. It consists of a vast number of metallic and wooden pipes, divided into different *stops*, the wind being admitted into the pipes from a bellows, and is played on by means of a key-board. The machinery of an organ, which is rather complicated and exceedingly curious, has been described in the preceding article.

Originally the word *organum* had a very extensive meaning, and signified nearly every kind of instrument, for whatever purpose employed. By degrees it was confined to instruments of music; afterwards it was applied only to those of the pneumatic, or wind, kind; and finally it was exclusively used to designate that 'world of sounds' which we call the Organ. It can hardly be doubted that this instrument may be traced to Pan's-pipes, or the Syrinx. It must soon have been discovered that the air may be forced into a closed cavity, and then distributed at will to one or more tubes; and pursuing the contrivance a little farther, something like a modern organ was likely to be produced. Indeed Mersenne, in his *Harmonie Universelle*, mentions an antient monument in the Mattei Gardens in Rome, on which appears the representation of a pneumatic organ. It is a small chest placed on a table. In the front is a female figure playing on a number of keys, and on the other side is a man blowing into the box with a pair of bellows exactly like those in present use. In Hawkins's *History* (i. 381) is an engraving of this, from a copy found among the papers of Haym, the author of a history of antient medals. St. Augustin, in his Comments on the 56th Psalm, alludes to instruments inflated by bellows. In the same passage he also gives us to understand that *organa* was a generic term, including every species. 'Organa,' he says, '*dicuntur* omnia instrumenta musicorum,' &c.

The descriptions left us by different authors of the musical instruments of the early part of the middle ages, and the representations of them on several monuments, prove that attempts were made at several periods to improve them. Much thought was expended in discovering the best method of introducing air into the pipes of their organ. For this purpose a fall of water was employed, and also what must be understood to have been steam. William of Malmesbury describes the manner in which the latter was used. He says, 'The wind, being forced out by the violence of the hot water, fills the whole cavity of the instrument, which, from several apertures, passing through brass pipes, sends forth musical notes.' At length bellows were employed for the purpose, which were either worked by water or by hand. The application of these two powers led to the distinguishing terms *hydraulic* and *pneumatic*, or water-organ and wind-organ; though, in point of fact, the ultimate result was the same in both. The inventor of the former, which historians call an *hydraulicon*, is ascribed to Ctesibius of Alexandria, who lived about B.C. 120-120. [CTESIBIUS.] Vitruvius is the first writer who gives any account of an organ of this kind.

The period when the organ was introduced into the churches of Western Europe is very uncertain. Pope Vitalian is supposed to have been the first to admit the instrument, about the year 670; but the earliest account to be at all relied on, of the introduction of this instrument in the West, is, that about the year 755 the Greek emperor Copronymus sent one as a present to Pepin, king of France. In the time of Charlemagne however organs became common in Europe. That prince had one built at Aix-la-Chapelle, in 812, on a Greek model, which the learned Benedictine, Bedos de Celles, in his vast but useful and excellent work, *L'Art du Facteur des Orgues* (1766), considers to have been the first that was furnished with bellows, without the use of water.

Before the tenth century organs were not only common in England, but exceeded, both in size and compass, those of the Continent. St. Dunstan gave one to the abbey of Malmesbury, in the reign of Edgar. Elfeg, bishop of Winchester, obtained one for his cathedral in 951, which was the largest then known. This is described, in eight Latin verses, by Wolstan, the learned monk of Winchester, in the tenth century, of which Mason, the poet, in his *Essay on Instrumental Church Music*, gives the following translation:—

> 'Twelve pair of bellows, rang'd in stated row,
> Are join'd above, and fourteen more below:
> These the full force of seventy men require,
> Who ceaseless toil, and plentifully perspire;
> Each aiding each, till all the wind be prest
> In the close confines of th' incumbent chest,
> On which four hundred pipes in order rise,
> To bellow forth that blast the chest supplies.'

The translator adds an explanation by no means unnecessary: 'We are not,' he says, 'I think, to imagine that these stout bellows-blowers kept their bellows in action all the time the organist was playing. I rather think that his performance did not commence till they had filled the chest completely with wind, which he was afterwards to expend by due degrees, as he found occasion.'

The organ was at first very rude in its construction, and extremely limited in its means. The keys were four or five inches broad, and must have been struck by the clenched hand, in the manner of the carillons: the pipes were of brass, harsh in sound, and the compass did not exceed a dozen or fifteen notes in the twelfth century; and to accompany the plain-chant, no more were required. About that time half notes were introduced at Venice, where also the important addition of pedals, or foot-keys, was first made in 1470, by Bernhard, a German, to whose countrymen we owe many improvements of the instrument; though in excellence of finish they have been surpassed by our English builders.

Few particulars are recorded concerning the organs of this country, from the Reformation to the time of Charles I. Camden mentions one at Wrexham, and Fuller has been strangely misguided in describing it to have had pipes of gold. It shared the general fate of organs in 1641; and the old York organ, lately replaced by a new instrument, was one of the very few that escaped the *organoclasts* of those times. At the Restoration it appeared that only four organ-builders of eminence survived, a circumstance which led to the introduction of foreign artists,—of Bernard Schmidt (commonly called *Father Smith*), and his two nephews, with the elder Harris, and his son Renatus. An account of the dispute between these two family parties is amusingly related in Burney's *Hist.*, ii., 437. Each erected an organ in the Temple church, as a trial of ability: Blow and Purcell displayed Smith's, and Mons. Lully (not the great composer) that of the Harris's. The lord chancellor Jeffries at length decided in favour of Smith. The principal organs of the latter are—the Temple; Christ-Church and St. Mary's, Oxford; Trinity College, Cambridge; St. Margaret's, Westminster; St. Clement's Danes; Southwell Minster; Trinity Church, Hull; and St. Paul's Cathedral. Harris's organ, after being rejected by the Templars, was divided; part was erected in St. Andrew's, Holborn, and part in Christ-Church, Dublin. This last portion was afterwards removed to Wolverhampton. His other principal instruments are those at St. Mary-Axe; St. Bride's; St. Lawrence, Cheapside; and Doncaster. He however, from some unexplained cause, was commissioned to make twice as many organs as his competitor. The *Spectator*, No. 552, says that he was ambitious of building an organ for the metropolitan cathedral. We have however no reason to regret that his wish was not gratified.

To these celebrated mechanicians succeeded Schreider, Smith's son-in-law, who built the organ in Westminster Abbey, and that at St. Martin's-in-the-Fields, the latter a present from George I. as churchwarden; Snetzler, Byfield, &c.; and at a later period, Green; Avery, who most successfully imitated Smith; Gray, Elliot, &c.

The tone of the pipes of the old builders—depending on what is technically called the *voicing*—has never been excelled by later makers; but in point of *touch*, and mechanism generally, the moderns are much superior to their predecessors. In mechanical skill and delicate finishing the English organ-builders far surpass their continental rivals, while in tone they at least equal them; but the costliness of our materials and high rate of wages render the organs of this country much more expensive than those of Germany, or even of France; though the profits of the builders do not bear the same proportion to their prices that is thought reasonable in most other manufacturers. It has been truly observed, that 'notwithstanding the imposing enumeration of so many stops, the large organs of the Continent are inferior in the choice and variety of them to the best English instruments;' a part being in fact but half-stops, and several only absurd imitations of other musical instruments, and rarely, if ever, used by scientific organists.

The following is a list of some of the largest and most celebrated foreign organs, from Crosse's *Account of the York Festival*, 1823, 'collected,' he says, 'from many sources, and enriched with some additions communicated by the Rev. C. I. Latrobe.'

	Stops.	Pipes.
Seville cathedral	100	5300
Goerlitz, in Upper Lusatia	82	3270
Hamburg, St. Michael's	67	
(9 pipes of 16 feet, and 3 of 32)		
Amsterdam, the old church	64	
Weingarten, a Benedictine monastery in Suabia	60	6666
(7 pipes are of 16 feet, and 3 of 32)		
Tours cathedral	60	
Haarlem	60	5000 nearly
(8 of these pipes are 16 feet, and 2 of 32: the greatest diameter being 15 inches. It is 108 feet high, and 50 broad.)		
Alost	53	
Berlin, St. Peter's	50	
Vienna, St. Michael's	40	
Rome, St. John Lateran	36	
Baltimore, in America	36	2213

Mr. (now Sir John) Barrow, in his 'Tour' (1830), mentions a new organ erected in the church of St. Lawrence, in Rotterdam, containing 5500 pipes, which, according to his calculation, is 150 feet in height.

Our English church-organs are numerous, and generally well toned. Though we have none Containing so many nominal stops as a few on the continent can boast, yet we possess some which, in regard to the greater calibre of the pipes, and power of every kind, surpass any foreign instrument. Chief among these are the new organ in York Cathedral, and that in the town-hall of Birmingham.

rk organ, built by Elliot and Hill, contains 56 hrough, besides 6 copula stops. The number 4200. The largest metal pipe is 32 feet in 20 inches in diameter; the largest wooden pipe long, 3 wide, and 2½ deep. This, the builder boasts, would contain twelve pipes and two gallons of wine. Both pipes give c, three octaves below the second space in the base. It has 3 rows of keys, and 2 octaves of pedals. The width of this instrument is 70 feet, and its height in proportion. The old York organ, burnt in 1829, was the largest in the kingdom; it had 3254 pipes distributed among 52 stops.

The Birmingham organ, built by Hill, and completed in 1836, is, as regards size and power, the rival of that at York, though the latter is superior in both, but not in quality. This is 35 feet wide, 15 deep, and 45 high. The swell box alone is the size of a moderately large church-organ. It has 40 real stops, about 3000 pipes, 4 rows of keys, and 2 octaves of pedals. The largest metal pipe is 35 feet long, and 21 inches in diameter, formed, as all the metal pipes in this instrument are, of zinc only. The weight of the whole is about 40 tons.

The organ in St. Paul's cathedral contains 1797 pipes, divided into 28 stops; 3 rows of keys, 2 octaves of pedals, and the largest pipe is 22 inches in diameter. That in Westminster Abbey has 28 stops, and 1524 pipes; 3 rows of keys, and double diapasons for the pedals. At Exeter is an organ, built by John Loosemore, in 1666; its largest pipes are 15 inches in diameter. The organ at Lynn, made by Snetzler, has 30 stops, and among them is a *dulciana*, there first introduced. Green built those at Canterbury, Windsor, Lichfield, and Salisbury. That in King's-College Chapel, Cambridge, was built by Avery. The organ at Yarmouth, erected in 1740, has 29 stops. St. Peter's, at Leeds, contains the same number, with 3 rows of keys, built by Messrs Greenwood of that place. The new church of St. Luke, Chelsea, has been provided with an organ, made by Nicholls, containing 33 stops and 1876 pipes. But the largest instrument in London is that of St. Sepulchre, which contains 2500 pipes, divided into 40 stops; though when that at Christ's Hospital (made by Hill) is finished, it will be much superior, in number of pipes and power, to any in the metropolis. The large organ in St. Patrick's, Dublin, was taken in one of the ships of the Spanish Armada, and presented to that cathedral by queen Elizabeth.

The *Barrel-Organ* is an instrument by which most of the effects of a small keyed-organ are produced by certain machinery. Instead of keys for the fingers, the keys, if so they may be called, are inside the organ, and acted on by means of a cylinder, or barrel, *pinned*, or studded, in a particular and singularly curious manner. This barrel is made to revolve by a winch, and in those of an expensive kind by wheel-work moved by a spring.

The Apollonicon is an instrument which combines in itself the keyed and barrel organ, and which has delighted and astonished all who have heard it. The Apollonicon to which we allude, will, we fear, soon be either removed from this metropolis, or be 'resolved into its elements.' As some description of it may hereafter be found useful, as a part of musico-mechanical history, we refer the reader to the article APOLLONICON, and to the *Harmonicon* (ix. 9).

(Mersenne; *L'Art du Facteur des Orgues*; Hawkins; Crosse's *York Festival*; Millin; *Harmonicon*.)

O'RGANON. It is not possible to give a definition of any science which shall convey its full import, and particularly to a person who does not already know what it is. This difficulty will be experienced by any one who attempts to give a definition of Logic. Without then attempting a definition, or admitting the completeness or correctness of any definition hitherto given, it may be sufficient, for the purpose of showing what that matter is about which we are discoursing, to say that logic is conversant about the formal laws of thought, and that it is not conversant about the matter which is subjected to such laws.

This thing, whatever it may be, about which logic is conversant, is presented to us, and is considered by us generally under the form of language. Whatever are the operations of the mind which are involved or contained in the exercise of thought, those operations may be generally expressed by language. It is assumed here, that by whatever names we designate the relation of the various consecutive and connected trains of ideas which pass through the mind, this relation is in all minds essentially the same. When two persons then possess a common language, one of them can express in this language, with a certain degree of accuracy, the various consecutive and connected trains of ideas which have passed through his mind with respect to any matter or matters. Another person, who, to use the common expresman, understands this language, can, through this medium, communicate with the other person's mind; and if the expression of such ideas has been accurately made according to the form of the language, and if they are properly interpreted, the person who hears or reads what the other has written or said, may in his own mind perceive the same variety [illegible] and connected trains of ideas which the writer or speaker has experienced. If language can effect this, it follows that the mental operations or processes in the two individuals are connected and assimilated by virtue of their both being conformable to the same general laws. It is however the laws of thought about which logic is concerned, and with language no further than as being the form of expression in which the thoughts of others are made known to us, and by which we are enabled to compare those thoughts with our own.

Under the article LANGUAGE it has been stated in a general way what language is; but mainly as to the materials of which it is composed. It remains now to consider its form.

What is called a *sentence* comprehends in its simplest form a subject and a predicate, with something by which a relation between the subject and the predicate is expressed. 'Men die' is a sentence, in which 'men' is the subject, of which 'dying' or 'death' is predicated; that is, in this sentence a judgment is expressed. The sentence indicates that two notions are present to the mind, 'men' and 'death.' What the relation is which the mind really contemplates between these two things, and how it is possible for the mind to contemplate this or any other relation between two things, belongs not to the present inquiry, nor to the province of logic. It will be sufficient to observe, that this judgment or relation does not express or mean, as some writers say, an *agreement* or *disagreement* between the two notions, or that one of them belongs or does not belong to the other; nor is it the *comparison* in the mind of these two notions, at least, logically considered, it is not the comparison in the mind of the two notions as to the matter of them.

The sentence 'men die' may also be expressed thus—'men are mortal;' where mortal is the predicate. The grammatical relation between 'men' and 'mortal,' which is the visible representation of that conceived by the mind, is expressed in our language by the substantive verb 'are,' which is accordingly, in such sentences as this, called the copula. In some languages, as the Latin and Greek, which are rich in terminations, the relation between 'men' and 'mortal' is thus expressed by a termination attached to the word 'mortal,' in addition to the copula, as 'homines sunt mortales;' and sometimes the copula *est* is omitted. When there is not a copula, either in the form of the verb 'to be' or in some other verb of equivalent meaning, the copula is either expressed solely by the order of the words, which is the case with those languages which, like the English, have few terminations, or the copula is expressed by a verbal termination which has a certain relation of fitness to the nominal termination, as in Latin and Greek, and in some cases by the order of the words also, as 'homines moriuntur.' The copula in itself has no meaning: its office is to indicate that the subject and the predicate of the sentence are contemplated as one and each in some relation to the other, in that operation of the mind of which the words 'men are mortal' is the visible or sensuous sign. But the subject itself may be qualified by an attribute, or the generality of the subject (which according to the common interpretation of language is universal when it is not limited) may be restricted or limited by the use of appropriate words, as, 'dying men are prophets,' or 'some dying men are prophets.' Again the predicate may in like manner be qualified or limited; as, 'he writes,' 'he writes a letter,' 'he writes letters sometimes.' Thus every sentence, however complicated it may appear, is reducible to the form of subject, predicate, and copula. 'A tall man on horseback in complete armour was seen crossing a deep and rapid river on a winter's day,' and other sentences of the kind with which ordinary books of narrative abound, may all be reduced to a simple form. It is true that the number of different things or notions which such a sentence brings before the mind often create a degree of confusion, and render the apprehension of the affirmation or negation, which every simple sentence contains, a matter of some difficulty; and this is particularly the case when a sentence so constructed brings before the mind not material objects with which we are familiar, but [illegible] of pure thought, which are not subject to the [illegible] of the senses. And hence it happens that argumentative discourse is not always the most difficult to apprehend. Indeed the difficulty of apprehension is sometimes greatest when the discourse consists of a long series of propositions in which under one set of circumstances one thing is affirmed or denied, or commanded or forbidden; and under another set of circumstances other things are affirmed or denied, or commanded or forbidden; or when things are stated, affirmatively or negatively, with a great many exceptions and limitations. A perusal of a modern act of parliament will show that this is so.

Sometimes there may appear to be, and in fact may be, a difficulty even in a very simple sentence, as to the resolution of it into subject, predicate, and copula. The discussion of this matter belongs to the doctrine of propositions; but so much may be here said, that so far as all propositions are contemplated in their formal and not their material character, they agree in this, that the subject is viewed as something either co-extensive with or included in the predicate. Both the form of language and the form of thought of which language is merely the expression forbid us to contemplate a subject in a greater extent than its predicate. The sentence 'I hope to succeed' is thus reduced (Whately's *Logic*, p. 59):—

$$\overbrace{\text{To succeed}}^{\text{sub.}} \quad \text{is} \quad \overbrace{\text{what I hope}}^{\text{pred.}};$$

which is the same thing as 'success is my hope;' and the remark is made 'that an infinitive (which the author has already defined to be a noun substantive) is never the predicate, except when another infinitive is the subject.' But we may just as well express the proposition thus:—

$$\overbrace{\text{What I hope}}^{\text{sub.}} \quad \text{is} \quad \overbrace{\text{to succeed}}^{\text{pred.}};$$

that is 'my hope is success.' Now as both 'hope' and 'success' are general terms, that is, are words capable of being applied severally to an infinity of particular things, and as neither hope nor success are conceived by the mind in any relation of subordination to one another, as that either of containing or contained, or of species and genus [GENUS], it is indifferent whether we use the phrase *my hope* (sub.) is *success* (pred.), or success (sub.) is my hope (pred.). But this sentence, we conceive, would by most people be reduced thus:—

$$\overset{\text{sub.}}{\text{I}} \quad \overbrace{\text{hope to succeed}}^{\text{pred.}};$$

where 'hope of success' is that which the subject, ego, predicates of itself, that is, these words indicate a mental operation in which the subject (it matters not whether contemplating itself or contemplated by another) is viewed (logically) simply as *within* certain limits of predication.

Every simple sentence which is intelligible is reducible to the form A is or is not B; but it should be observed that the former sentence has two meanings, as already observed. It may mean either that A is contained in B, or that A is co-extensive with B, where A is the subject, and B the predicate, and *is* the copula. It is important to bear in mind this double meaning of the sentence 'A is B.' If it should be said that 'A is B' may also mean 'A contains B,' we can then say that B is contained in A; and so we are where we were before. In ordinary language the ambiguity of the form A is B is sometimes removed by words of limitation, as 'all,' 'every,' 'some;' but frequently there are no such words used, and the consequence is ambiguity.

The sentence 'A is not B' may mean either that A is not co-extensive with B, or that no part of A is contained in B, or that some part of A is not contained in B; but this ambiguity also is generally avoided in common speech by the use of words of limitation, or by attaching the negative to the subject. It is obvious that negative propositions are subject to more ambiguity than affirmative propositions. Negative propositions have given logicians much trouble, and it is clear that we only obtain a clear notion of their import by a tacit reference to affirmative propositions. In itself a negative proposition has no meaning; by the very supposition of its being negative, it excludes the notion of all significancy; and yet by means of such propositions we attain to knowledge. The Stoics (who seem to have had a logic of their own) called such a sentence as 'Pleasure is not good' an affirmative sentence also: their reasons for this are stated, though somewhat obscurely, by Apuleius. (*Philosophy of Plato*, iii. iii.)

Simple sentences are generally combined in written or spoken discourse in such a manner that the whole meaning of the speaker cannot be reached except by considering two or more sentences together. Sentences may be so combined, either in the way of co-ordination or sub-ordination, but this distinction, which is made by Dr. Becker in his excellent German grammar, though it is applicable to some extent to all languages, is perhaps more particularly applicable to the German language than to our own. Two sentences are combined by way of co-ordination when they are connected by such a conjunction as *and*, as 'he eats and drinks,' where we have two distinct sentences, each of which contains a separate and independent affirmation; but we cannot reach the whole of what is said of the subject 'he,' without contemplating the two sentences together. The conjunction 'but' is also often used to unite co-ordinate sentences, as 'he speaks German, but not fluently,' where the sentence beginning with 'but' limits the generality of the former assertion: and the whole sentence does not differ in meaning from 'he speaks German, and he speaks German not fluently.' Subordinate sentences are connected with the principal sentence in a great variety of ways, among which the union by means of the pronouns and words of pronominal origin is perhaps the most frequent: as, 'I do not know when he will come;' 'he lives luxuriously, while others are starving.'

In both cases, both the combination of co-ordinate sentences and the combination of a subordinate with a principal sentence, certain words are used, which are generally distinguished from other words which connect sentences, by the name of *causal;* such are in English, 'for,' 'therefore,' 'then,' and 'since' (not as words indicating time), 'because,' and some others. All languages have words which correspond in meaning to these words. Now it is the combination of sentences produced by such words as these which generally makes up a large part of discourse, written or spoken. When the discourse is bare narration of facts, it is often little more than a succession of affirmative or negative propositions, but so connected and expressed as to render the discourse more pleasing than if the propositions were enunciated separately and in their simple form; but still not logically connected. Besides the ornament and variety which we are enabled to give by written discourse to mere narrative, there is generally a kind of coherence or sequence in the bare facts of narration, which, when some facts are known, can be anticipated by the hearer or reader, and this again helps to render the language of bare narration less tedious.

But when discourse is not limited to bare narration of facts, it assumes a form which still more interests the hearer or reader, and keeps his intellectual powers in constant exercise. Here the discourse does not barely communicate something from the writer to the reader: it does more; it is constantly addressing itself to those faculties of the reason which the reader and the writer have in common, and it is constantly proceeding on the assumption that a great number of universal propositions are admitted to be true by the reader and the writer. Thus, if we say of a certain man—'he is not liked, because he is presumptuous,' two things are affirmed; first, that a 'certain man is not liked;' second, 'that he is presumptuous.' But by the use of the word 'because,' the writer means to affirm something more than the truth of the two propositions; for we may suppose it possible to affirm many propositions of a man without considering the propositions related to one another in any other way than as all relating to one man as the subject. The words 'because he is presumptuous' are designed by the writer to express some connection with or relation to 'not being liked,' which connection or relation must exist in the mind of all other persons as well as in his own, or it cannot be understood. Now, what is that connection which he and all mankind, and a large part of mankind unconsciously, contemplate when this compound sentence is enunciated? The subject of the whole sentence is some given person or individual who is said 'not to be liked,' a proposition universally intelligible. He is said 'to be presumptuous,' which is also universally intelligible. Now, the word 'because' has this office:—it introduces something to the reader's notice to which the universal judgment of mankind attaches the notion of dislike; something which is followed ' something without which there may be dis- with which there must be dislike; that is, n this sense: the reader does not know the individual spoken of, and therefore does not know that he is disliked till he is told so; but he knows something of that individual, namely his presumption, and he also knows that he dislikes a presumptuous individual. He therefore understands the writer, and he admits that statement which is introduced by the word 'because' as a *reason* (to use the common expression) why the man is disliked. He has in fact assented to the universal proposition that 'a presumptuous man is disliked;' he has already mentally formed for himself a general rule that all presumptuous people are disliked, and it is by virtue of himself and the writer acknowledging this universal affirmation as true, that he collects the writer's meaning. But there is no logical inference here; there is no syllogism.

The speaker or writer might however say, all that he knew of a certain man was 'that he was presumptuous;' and he might add to the sentence, and 'therefore I conclude that he is disliked.' If the reader or hearer assented to the conclusion introduced by the word 'therefore,' he would assent to the following mode of stating what he had heard:—

1. All presumptuous persons are disliked.
2. This man is a presumptuous person.
3. Therefore he is disliked;

which is called a syllogism, and is one of the most common forms of a syllogism, in which the first part, or major premiss, is not expressed. The greatest part of written and spoken discourse is either in this form or in that of a consecutive series of syllogisms, called, by logicians, sorites.

The first two propositions are generally called the *premises*, and the third is called the conclusion; and in such a syllogism everything which is called a conclusion is deduced, or considered as deduced, from two other propositions, one of which, as already observed, is commonly suppressed, but is referred to by such a word as 'because,' 'therefore,' &c. It is however very clear that nothing is *proved* even by a syllogism. In the common form of language something is affirmed particularly as a fact, and something is said in the way of a conclusion. The mind perceives no reason why this conclusion is made in the particular instance, more than it should be in any other given instance of the same kind. But while something is in form concluded particularly, something is by implication affirmed universally. A person not accustomed to analyse his own thoughts may not always be able to discover what is that universal affirmation which contains the particular conclusion; but if the argument, as it is generally termed, be expressed in the complete form of a syllogism, he at once perceives what universal proposition must be admitted or proved, in order that the particular one shall be true; if he has already given his assent to the proposition as stated, without a clear conception of the extent of the admission which he will be considered to have made, he is enabled by means of the syllogistic form to examine more clearly that mental operation which to him was before confused. The conclusion of the syllogism *proves* nothing. as an inference or illation it necessarily follows from the premises, that is, the mind cannot conceive it otherwise; and in this operation it is subjected to laws of thought which are irresistible. When the truth of the premises is ascertained or admitted (which, for the purpose of argumentation, is the same thing) the conclusion, which before was logically correct, now becomes also true. All discourse of the kind called argumentative, indeed all discourse so far as it contains inferences, may be reduced to the form of a series of syllogisms, from which it will appear what universal affirmations or negations are implicitly contained in the discourse. It will also show what universal affirmations or negations are used as a means of attaining to other affirmations or negations which are not true unless the first are true, and which when attained become the premises of other conclusions. Discourse of the argumentative kind has for its object to establish particular things, or things which are comprehended within other things. Particular things, so far as they are the objects of sensuous perceptions, are directly established by evidence, as for instance, the qualities of any material object; but there are many things which are not susceptible of this kind of evidence, and of which there is no evidence but the universal consent of mankind. In an argumentative discourse therefore the writer who has particular things to prove, alleges, expressly or by implication, universal truths, and he affirms, either expressly or by the implication of language, that the particular things are contained within the universal. If the reader assent to the universal truths, and also admit that the particular things are contained therein, the writer accomplishes his purpose, and his demonstration is complete. He is said to have 'inferred something, or to have made a deduction.' If all written or spoken discourse were in the form of perfect syllogisms, there would be little confusion or dispute about what is called the premises and the conclusion, for the whole matter would be so placed before the reader that he would always perceive the general proposition within which it is affirmed that the particular is included. It is then the general condition of every syllogism imperfectly expressed, that when we are speaking of what we call one thing, we are in effect speaking of many things: for that which is asserted of one can equally be asserted of all things of the kind, and it is not possible to conceive it true of one without conceiving it true of all.

Some writers have observed that the causal conjunctions are employed to denote respectively cause and effect, as well as premises and conclusion; as in the following examples:—'The ground is rich *because* the trees on it are flourishing;' or, 'the trees are flourishing, and *therefore* the soil *must be* rich;' where the conjunctions *because* and *therefore* are considered to be used to denote the connection of premises and conclusion. But in the following sentences, 'the trees flourish *because* the ground is rich;' or, 'the ground is rich, and *therefore* the trees flourish;' the same conjunctions, it is said, are used to denote the connection of cause and effect; and it is added that in the latter case 'the luxuriance of the trees, being evident to the eye, would hardly need to be *proved*, but might need to be accounted for;' and as to the former case, it is remarked, 'that the luxuriance of the trees is not the cause of the soil's fertility, but only the cause of my *knowing it*.'

Now in the expression, 'the trees are flourishing, and *therefore* the soil *must be* rich' (if for *must be* we write *is*, which ought to be done), it may be meant to affirm, either that the trees are flourishing, and that the quality of the soil is unknown; or it may be meant that the trees are flourishing, and that the soil also is *rich*. In the former case the richness of the soil is concluded, according to the common expression, from the supposed premiss of the invariable coincidence of flourishing trees and rich soil, and as the world knows or says (which for the present purpose is the same thing) that a rich soil is necessary in order that trees may flourish, the richness of the soil is in fact, according to the common notion of cause and effect, here also considered to be the cause of the luxuriance of the trees, if we look to the matter of the syllogism. In the latter case, if both things are affirmed, both that the trees flourish and that the soil is rich, the same thing is affirmed as in the sentence 'the ground is rich and *therefore* the trees flourish;' and in both these cases, when the two propositions are considered as affirmations, not connected in the way of conclusion, nothing more is effected by the word *therefore* than to suggest the notion of the invariable coincidence of flourishing trees and rich soil.

The Conclusion of the 'ground being rich *because* the trees on it are flourishing' (the richness of the ground in question not being known otherwise than by the trees) cannot be made except from the premiss, 'wherever trees flourish, there the ground is rich.' Now though it may be true that 'wherever trees flourish, there the ground is rich,' it may not be true that 'wherever the ground is rich, there trees flourish,' for the ground may be rich, and covered with water in which trees will not flourish. But if we affirm that 'the trees flourish *because* the ground is rich,' we affirm both 'that the trees flourish' and 'that the ground is rich,' which again is nothing more than affirming by implication that 'wherever trees flourish, there the ground is rich,' leaving it, as before, possible that there may be rich ground where trees do not (for some reason or other) flourish.

Now it is said that in the former case, where a Conclusion is made, the 'luxuriance of the trees is considered to be the cause of my *knowing* the fertility of the soil:' that is, in the conclusion, 'the ground is rich because the trees on it are flourishing,' 'the ground is rich' is my (concluded) knowledge, and *because* is there used to express cause and effect, as between 'flourishing trees' and 'my knowledge.' In the latter case, where both propositions are affirmative, but neither of them in the way of conclusion, it is said that the luxuriance of the trees does not require *proof*, but requires to be accounted for; that is, richness of soil and luxuriance are here considered in the relation of cause and effect. According to this, a relation of cause and effect, though not of the same cause and effect, is indicated in both cases by the word *because*; and in the former case the *richness of the soil* is considered to be *proved* also.

This is rather perplexing, but perhaps the perplexity may be got rid of thus:—'The ground is rich, *because* the trees on it are flourishing,' is necessarily *true*, if it is also true that 'wherever trees flourish, there the ground is rich;' but this *general* proposition must be *proved* in some way or assumed, in order that the logical conclusion may also be a true conclusion. 'The trees flourish *because* the ground is rich:' here both facts are *proved* or assumed (which for the present purpose is the same thing), and it is also affirmed by implication that 'wherever trees flourish, there the ground is rich.' The difference between the two sentences then is this: the former affirms that a particular soil is rich if soil is always rich under similar circumstances; and the reduction of the expression to the complete syllogistic form shows us what must be proved or assumed in order that the conclusion shall be true in this particular case. The latter affirms the particular thing to be true, which in the *former* is only true upon a certain condition; and it also affirms by implication the truth of this certain condition. The *former* is a syllogism, because that which is said of the whole may be said of a part. The latter is nothing more than the implicit statement of a general proposition contained in the explicit statement of a particular instance: it is no logical inference; it is no logical induction; it is simply a statement of a thing being true in a certain case, with an implicit assertion that the same thing is true in all similar cases; in other words, the form of language implicitly contains the affirmation of a general proposition, which can only be the result of an induction in the non-logical sense of that term.

The difference between logical Deduction and Induction is explained in the article INDUCTION. But it will not be out of place to say a few words on the subject here. In the Deductive Syllogism, we proceed from the whole to its parts, from the thing containing to the things or some of the things contained; and this is true notwithstanding it is not so expressed in the common form of language. For the particular conclusion, as already observed, is the thing which in ordinary language is said to be proved; but there is no demonstrative evidence to the mind, except it is shown that the particular conclusion is contained in a general proposition. The deductive syllogism as already explained shows what this general proposition is, and this general proposition is assumed to be true, or is known to be true in some other way (by induction, properly so called, for instance) than by means of the syllogism. But there is another mode of operation by which the mind can proceed from particulars to generals; but this, which may be called the Inductive Syllogism, is no syllogism, that is, no necessary conclusion, unless *all* the particulars are enumerated, or assumed to be enumerated; and in this consists the difference between the Inductive Syllogism and Induction, or what is sometimes, but, we think, not with strict propriety, called Inductive Reasoning, which however is no operation of reason, but one of the understanding only; or, to prevent disputes about terms, it is not the same mental process as that of the Logical Induction, for its conclusion is not necessary. This Induction then, which leads us from the observation of one or more like facts to make a general assertion which will comprehend like facts not observed, is a material illation of quite a different character from the other. This process has sometimes been absurdly considered as a peculiar discovery of modern times, though it must have been practised by the first man who ever made use of his eyes. The process of investigating and collecting facts which are among the phenomena of the material world, has been greatly *improved* in modern times.

That syllogistic form which is properly called Inductive (ἐπαγωγή) is explained, though very briefly, by Aristotle (*Analyt. Prior.*, ii. 23; *Topic.*, i. 12), and is not confounded by him with the material induction of a general law or rule from the examination of a number of particular cases of a like kind.*

If we wish to prove syllogistically the mortality of a given individual John, we say—

All men are mortal;
John is a man;
Therefore John is mortal.

Now this conclusion is necessary, because 'John' is contained in 'all men.' But suppose we wish to prove our primary proposition, that 'all men are mortal,' what is the process that we must follow? We may affirm mortality of all men who have died, but we cannot affirm it of all who are living and who shall live, for that is the thing to be proved. This is a case in which there can be no logical, that is, no necessary conclusion.

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* Ἐπαγωγὴ μὲν οὖν ἐστι, καὶ ὁ ἐξ ἐπαγωγῆς συλλογισμὸς, τὸ διὰ τοῦ ἑτέρου θάτερον ἄκρον τῷ μέσῳ συλλογίσασθαι.

Dr. Whately says (p. 229) 'that in the process of reasoning by which we deduce from our observation of certain known cases an inference with respect to unknown ones, we are employing a syllogism in barbara with the major premiss suppressed; that being always substantially the same, as it asserts 'that whatever belongs to the individual or individuals we have examined, belongs to the whole class under which they come.'

And he further says that induction, 'so far forth as it is an *argument* (which has previously, in the same work (p. 55), been defined to be a 'syllogism when regularly expressed'), may of course be stated syllogistically; but so far forth as it is a *process of inquiry* to obtain the premises of that argument, it is of course out of the province of logic.' But a syllogism will be equally good (p. 14) if we substitute arbitrary symbols for the terms, without any regard to the things signified by them; and (p. 23) 'every conclusion is deduced from two other propositions or premises.' This so-called induction then, stated syllogistically, turns out to be nothing different from a proper syllogism: if the premises are true, the conclusion is necessarily true. The syllogism then has done nothing, and it leaves the process of inquiry precisely where it was before the induction was put into this so-called syllogistic form.

This mistake requires a few more words, as it has been declared to be 'a just, and, so far as we are aware, an original remark; and its consequences are extremely important.' (*Westminster Review*, No. 17, p. 169.)

The deducing an inference from facts investigated and collected is said to be an argumentative process, and, like other arguments (that is, syllogisms), capable of being syllogistically expressed. If it is a syllogistic process, it is undoubtedly susceptible of the strict syllogistic form. Now this so called inference is the making a universal affirmation founded on a number of particulars; and if it is a syllogism, the universal affirmation is the conclusion; and if it is a syllogism, the conclusion is necessary. The conclusion is by the supposition a conclusion from certain known things as to other unknown things; and the universal conclusion is, that something is true of the unknown things which is known to be true of the known ones; in other words, that this something is true both of the known and the unknown things. Now in order to attain this syllogistic conclusion, it is said that we employ a syllogism, in which the major premiss is of this form: everything which is true of the known is true of the unknown, or everything which is true of the known is true of the known and the unknown.

To take Dr. Whately's own example: 'from an examination of the history of several tyrannies, and finding that each of them was of short duration, we conclude that the same is *likely* to be the case with all tyrannies.' And it is said that in such syllogisms as these, we assume 'that *whatever* belongs to the individual or individuals that we are examining belongs to the class under which they come.' Now this universal affirmation is a proposition *to be proved* in some way or other. If it be assumed, it is the major of a deductive syllogism, and the conclusion is logically necessary, and also true, if the major is true. But how is this major to be established, by virtue of which we are to have a logical illation and a true conclusion? It is admitted that in induction, properly so called, a general material truth is to be affirmed by virtue of *particular* facts being investigated and known. But if we affirm some proposition which is more general than and comprehends that which we wish to establish, and then so construct our syllogism that the conclusion shall be a logical inference, it cannot be a true one also unless we establish this more general premiss. But the object of the true induction is to establish the general truth from particular facts that are known and investigated. If, in the case supposed, the syllogism is valid, the particular facts are useless; the conclusion is logically good, and it becomes materially true when the more general proposition is established which contains the conclusion. But it is not the object of the investigation and collection of facts to establish a proposition different from and more general than that for the establishment of which the facts are investigated and collected, in other words, it is not the matter in hand to investigate and collect facts for a particular purpose, and then not to use them for that purpose.

In this so-called syllogism then we have a suppressed major of this form, 'that which is true of some is true of all,' which must mean either 'everything which is true of some is true of all,' or, 'this one thing which is true of some is true of all.' In the former case, the suppressed major expresses a general proposition, which we must establish in order that our illation, which is logically correct, may be true materially; but then this is not the proposition which we profess to be desirous to establish, and, more than that, it cannot be established by the facts investigated and collected. If it means that this *one thing* which is true of some is true of all, this is nothing more than to make the conclusion the major premiss, and so to conclude the conclusion from itself. It cannot be supposed that Dr. Whately has any such absurd meaning as this: but his language is capable of this meaning. He does however mean either this or the other; and it is not easy to say which is the less logical meaning of the two.

A few more words seem necessary on another passage in Dr. Whately's work, by way of clearing the way to a right comprehension of the province of logic. It has been already observed that discourse or speech generally assumes the form of a syllogism with one of the premises suppressed; which is by many modern logicians called an enthymeme.*

Dr. Whately observes that the enthymeme (the enthymeme of modern logicians) 'is *not strictly syllogistic*, i.e. its conclusiveness is not apparent from the mere form of the expression, without regard to the meaning of the terms; because it is from *that* we form our judgment as to the truth of the suppressed premiss. The expressed (qu. *suppressed*) premiss may be true, and yet the conclusion false.' The reason here given why the (so-called) enthymeme is not strictly syllogistic is, that we form our judgment of the truth of the suppressed premiss from the meaning of the terms. This is a singular reason. The *truth* of the suppressed premiss has nothing to do with the validity of the conclusion as an inference. If the suppressed premiss were expressed, the question as to the conclusion would be, not whether the suppressed premiss were true, but whether it necessitated the conclusion. If the conclusion is already made and one premiss only stated, the *truth* of the suppressed premiss is not the matter in question, but only *what* it is; and when we have ascertained what the premiss must be in order that the conclusion may be valid as an inference, we may then inquire if the suppressed premiss is true. The expressed premiss cannot be true and the conclusion false, for the proper suppressed premiss is virtually involved in the conclusion and the expressed premiss. Besides, the mere form of the expression does indicate the suppressed premiss; if it did not, the enthymeme, that is, the incomplete syllogism, the syllogism of common discourse, would be incapable of being expressed in the form of a complete syllogism. If we say A is C, *because* or *for* it is B, which is the mere *form* of the expression, we see that the suppressed premiss is, B is C, that is, B is contained in or is co-extensive with C; and every person who can comprehend the notion of a containing whole and its contained parts will understand what is meant if it is expressed in this form: A is contained in C because A is contained in B. As if a man had found that any one thing could be contained in another (second) thing, and this other (second) thing were contained in a third, he would conclude mentally that this one thing was contained in the third; and the form of his expression would be, it is contained in the third *because* it is contained in the second, in which he would tacitly suppose that the second is contained in the third, and would then necessarily conclude that the first is contained in the third.

We are now in a condition to show what are the limits of pure logic, or of a pure logic. All propositions and all syllogisms are the subject of a pure logic only so far as they have all something in common. They have only something in common so far as they are all capable of being reduced to a common form or forms; that is, a pure logic is formal.

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* It has been observed by a learned writer ('Edinburgh Review,' No. [illegible]) that this is not the meaning of the enthymeme of Aristotle's [illegible] true, nor is it the meaning of the enthymeme of Cicero. The following passages may be referred to as showing the meanings of the old enthymeme (ενθυμημα), which seems to have been taken by different writers in different senses: Aristotle (Anal. Prior. ii. 27), Cicero (Topica, 13, 14), [illegible] (περὶ Ἑρμηνείας, [illegible]). [illegible] to the modern enthymeme (Comment. in Cic. Topic. [illegible])

[illegible]. Whether the syllogism may in parts regard the mat-[illegible] and the propositions which enter into the syllogism [illegible], the object of logic as far as they are connected [illegible] and is not. And since all propositions when viewed [illegible] as the parts of a syllogism, must be capable of being reduced to the same form or forms, it follows that all propositions as logical elements connected by it and [illegible] are [illegible] to that way in which the reason does, and must because it does, view all things which are so presented to the mind independently of the matter, namely, with relation to the notion of a containing whole and contained parts.

[illegible] this exposition above follows, the fault is with those [illegible], while they profess to teach pure logic, confound it both with an applied logic and with other things also.

There seems to us another error in Dr. Whately which is worth noticing: he says, 'No conversion is employed for any logical purpose, unless it be illative;' and he adds, 'The reader must not suppose from the use of the word "illative," that this conversion is a process of reasoning; it is in fact only stating the same judgment in another form.' Now if we say A is B, meaning that A is contained in B, it is a logical consequence or conclusion, though not a syllogistic one, that B is not contained in A. In this case there can be no unlimited logical conversion of the proposition. If A is coextensive with B, then B is coextensive with A; in which case there is a logical conversion. The laws of thought necessitate the non-conversion in the one case and the conversion in the other; and if these are not logical conclusions, there is no such thing as a pure logic or reasoning.

It is generally said that logic teaches us to reason correctly, or that it shows the process which takes place in the mind when a man does reason correctly. It is however difficult to admit the accuracy of this statement. If a man reasons at all, in the strict logical sense, he reasons correctly. Language is seldom expressed in the form of syllogisms, and it is not usual to express, in any way, both the propositions from which we deduce a conclusion. We generally express ourselves by way of a conclusion and one premise, but this being so, the suppressed premise may always be discovered by analysis, though the speaker or writer may not always be able to discover his own suppressed premise. A conclusion and one premise being given, the suppressed premise is also given, for the conclusion and the expressed premise necessitate the proper suppressed premise. They who say a man argues incorrectly, when he states a conclusion and one premise only, assume that his suppressed premise is not that suppressed premise which the two data require, but some other. But if some other, it is impossible that they can find it out, and therefore they cannot confute him. It is only because the suppressed premise (perhaps not known to the speaker) pointed to by the data, is the false one, that we can confute the speaker. We show what the suppressed premise is, and then we are in a condition to dispute it, and to ask him for proof of it. A man then does reason correctly when he reasons by a conclusion and one expressed premise. The syllogistic form shows us what the premise must be, that is, it leads to the full interpretation of the speaker's meaning. But suppose a man expresses all the terms of a syllogism, and his syllogism is vicious, is it vicious because he reasons wrong, or because he has given a meaning to some of his terms which other people do not, or misunderstands them? We think that his reasoning, as such, is and must be correct. His apprehension may be and often is wrong. In this view, reasoning, as reasoning, is always correct reasoning. It has been objected to this by a friend, that many persons who are not familiar with logical considerations, on being asked whether, if every A is B, every B is also A, will admit this conversion to be true, and that, when asked it, in admitting this, they reason incorrectly. The answer to this difficulty is furnished by the objector. He goes on to say, that if the person who admits this conversion is asked the same question as to a material conversion, such as, every goose is an animal, he immediately perceives that he cannot say every animal is a goose. This shows that his apprehension of the expression, every A is B, was incorrect, that is, he did not understand it, but took the words as meaning something different from what the person intended who put the question.

In argumentation the conclusions are the matters which [illegible] disputed, and the suppressed proposition is [illegible] the real matter in dispute, or the meaning of a [illegible] is the matter in dispute. The use of logical forms consists in showing fully and explicitly what is expressed imperfectly and only implicitly in the common form of language; and its use is not a bit the less because it neither teaches to reason nor convicts our reason of error. Its use is to indicate to us all the formal elements and conditions of dependent truth. It points out to us and leads us to the consideration of the several propositions which discourse contains, and from the consideration of the several propositions it leads to the terms, and there it leaves us.

The cause of this confusion between logic and metaphysic is obvious, and lies in the necessity which all men feel of a metaphysic of some kind or other. General terms and general propositions, the elements of every material syllogism, are deeply fixed in the mind long before its consciousness is awakened to the cognizance of the operations of the reason; and in many minds this consciousness is never called into existence. Logicians clearly perceive the value of the syllogistic forms as an aid and a formal help in analysing the reasoning process in a given case; they also see or feel that the reasoning process in itself is not knowledge, but they see that it is a means to knowledge. Its barrenness in itself is confounded with its productive powers when exercised on a material, and hence they have come to confound its operating energies with its products; as if a man should confound his tools with that which is produced by his tools operating on his materials.

A pure logic will lead all men to a metaphysic, for a pure logic has its use in its applications. A metaphysic, as a system, if it does not contain a logic, will lead to the results of most systems of metaphysics, that is, to none at all.

Thus it appears that the study of logic is perhaps the proper introduction to a metaphysic; and it were much to be wished that all who have written on the latter had first been subjected to the discipline of the former.

The forms of the SYLLOGISM are considered under that article, consistently with the plan of this work. In the mean time, till we have some system of logic in our language which is founded upon and grows out of some philosophical system, it is better for the student to study only a purely formal logic, which is independent of any philosophical system, and to apply it to his various studies. For such purpose, a small pamphlet such as Professor De Morgan's 'First Notions of Logic, preparatory to the Study of Geometry,' London, 1839, seems to us the only kind of book in our language that can be safely recommended.

The question, What is Logic? has been a matter of much dispute. It has also been disputed whether logic is a science or an art, or both—an idle question, which may be safely left undecided. It is more important to determine what is comprehended in the term logic, and this has partly been attempted here. It is also of some importance to show that the notions of this science do not appear to have been very exact among the Greeks and Romans, which may be one cause of the traditional confusion as to the limits of logic which has been so common in modern times. It may be also useful to show what logic is conceived to be by some modern writers.

There is no definition of logic in the extant works of Aristotle; and if we deduce from his Organon, as we now have it, our notion of what the term comprehends, we shall find that it contains a great deal which does not belong to logic as it has been understood by those who have formed the most exact notions of it. If we should attempt to ascertain what logic is from the writings of all who have written on logic, it will be found impossible to form any exact notion of its limits and objects.

Dialectic is distinguished by Cicero (*Topica*, 2) from Topic. 'All exact argumentation,' he observes, 'consists of two parts, one comprehending invention (unam inveniendi), and the other judgment (alteram judicandi).' He assigns to Aristotle pre-eminence in both, and speaks of the Stoics as having especially applied themselves to the latter, which they named Dialectic. But the dialectic of the Stoics was certainly not confined to pure logic, as appears from what Cicero says in his treatise 'On the Orator' (ii. 38), and also from the statement of the Stoical opinions as to dialectic by Diogenes Laertius, in his Life of Zeno of Citium. The Stoic dialectic seems to have comprehended logic and more, as will hereafter appear; and yet it comprehended less than the logic of the Peripatetics.*

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* See also the threefold division of Philosophy by Diogenes Laertius ([illegible]) into Physics [illegible] Ethics [illegible] and Dialectic [illegible]

In Dr. Whately's treatise, as may be collected from a comparison of various passages, logic seems to be convertible with syllogistic. To *reason*, in the strict sense of the word, is to make use of arguments (p. 18); an argument, when regularly expressed, is a syllogism (p. 55); and logic is the science and the art of reasoning (p. 1): from which it follows that to syllogise and to reason are convertible, and that logic is the theory of the syllogism (p. 73).* This seems to be the meaning of the author, and if such be the proper notion of logic, it must be admitted that the boundaries of the science are very limited indeed. But limited as they really are, in this view of the subject, the exercise of reducing argumentation to syllogistic forms still contains more than those may be inclined to suppose who have not been disciplined in this practice.

It may be worth while to notice what Dr. Whately says of the word *argument*. 'Every argument,' he observes, 'consists of two parts, that which is proved, and that by means of which it is proved;' and he adds in a note, that this is the strict technical sense of the word argument, but that in popular use argument is often employed to denote the latter of these two parts alone. But this is a mistake: the popular use is the correct use, as it is in many other cases. When a man is said to use a good argument, he urges or suggests something which is either proved or universally admitted, and the goodness of his argument consists in its being applicable to the matter in hand, and obviously comprehending within it something which it is his object to establish or prove. He who argues well, possesses the inventive faculty as defined by Cicero. It is his business to establish one or more things, and to command the assent of his hearers by presenting to their minds such propositions as only need to be presented in order to command assent, and which are comprehensive enough to embrace the particular things which he has to establish. The argument, in the popular sense, is the premises of the syllogism; or it is the middle term; and it is accordingly explained by Cicero (*Topica*, 2) to be 'ratio, quæ rei dubiæ faciat fidem,' the *reason*, which gives credibility to a thing that is doubtful. Of course that which is proved or to be proved cannot be an argument within Cicero's meaning of the term. Dr. Whately himself says, 'that which is used to prove the question, if stated *last* (as is often done in common discourse), is called the *reason*.' But it is equally the reason whether placed first or last, and is called the *reason* with strict technical propriety, whatever may be the place which it occupies in discourse. The proper name for the syllogism is argumentation, of which the two premises are the argument; and this is the sense in which antient logical writers understood argumentation and argument.

The meaning of the term Logic is explained by Kant with his usual clearness. Logic is the science of the laws of thought. Logic may be considered from two points of view, as General or Special. General logic comprehends only the necessary laws of thought, without which there can be no exercise of the Understanding, and it has no reference to any difference in the objects to which it is applied. Special logic comprehends the rules of thinking rightly on any given subject. General logic again is either Pure or Applied logic. In the former we abstract from all empirical conditions under which our understanding is exercised, as for instance, the influence of the senses, imagination, memory, &c. A General and Pure Logic has consequently only to deal with pure *à priori* principles, and is a canon of the Understanding and of the Reason, but only in respect to the formal part of its use; the matter which is its object may be either empirical or transcendental. A General Logic is called Applied when it has reference to the rules of the exercise of the Understanding under the subjective empirical conditions, which we learn from psychology. It has consequently empirical principles, though it is so far General that it has reference to the exercise of the understanding without any distinction of objects. In General Logic consequently, the part which comprehends the pure doctrine of the Reason must be absolutely separated from that which is Applied, though still General Logic. The first part only is properly a science, though brief and dry, as the regular exhibition of an elementary view of the Understanding must be. In this science then logicians must always bear two rules in mind:—

1. As General Logic, it abstracts from everything which the understanding contains as knowledge, and from all differences in its objects, and it has only to do with the pure form of thought.

2. As Pure Logic, it has no empirical principles, and consequently derives nothing (as has been sometimes supposed) from psychology, which therefore has no influence at all on the canon of the understanding. It is a demonstrated science, and everything in it must be absolutely *à priori* true. (Kant, *Critik der Reinen Vernunft*, p. 55. &c., ed. 1828.)

By Applied Logic, Kant understands an exhibition of the understanding and the rules of its necessary exercise *in concreto*, namely, under those accidental conditions of the subject which may assist or impede its exercise, and all which are only empirical data. It treats of attention, its impediments and consequences, the origin of error, the state of doubt, conviction, &c.

General logic then abstracts from all our knowledge, that is, from all relation of our knowledge to an object, and contemplates only the logical form in the relation of the parts of our knowledge to one another, that is, the form of thought generally. So far as truth is concerned, since logic is conversant only about the general and necessary rules of thought, the criterion of its truth must lie in these rules; and whatever contradicts them is false, for logic would then contradict itself. Yet though a logic may be consistent, that is, not self-contradictory, yet it may be contradictory to the object; consequently the bare logical criterion of truth, namely, the conformity of knowledge with the general and formal laws of thought and of the reason, is the *conditio sine quâ non*, and consequently the negative condition of all truth. Further however logic cannot go, and any error which affects not the form, but the matter, logic has no means of detecting.

A recent German writer has viewed logic in a somewhat different light, and given it a wider range. The difficulty of presenting anything like an adequate view of the principles of Hegel by a few extracts must be the apology for this imperfect attempt; the obscurity of the exposition, if such it shall appear, may be partly though not entirely due to ourselves.

'That which is generally understood by the term logic, is viewed altogether independent of any metaphysical signification. In its present condition this science has no subject-matter (inhalt) in the sense in which subject-matter is considered as a reality and as a truth in the ordinary acceptation of the term. But it is not for this reason a formal science which is devoid of truth. The region of truth however must not be sought for in that material which people expect to find in logic, and to the want of which its unsatisfactory nature is usually attributed; but the emptiness of logical forms rather lies in the way in which they are considered and handled. So far as logical forms, considered as determinate notions, are disjointed from one another, and not bound together in organic unity, they are dead forms, and have not in them the spirit which is their living concrete unity. Thus viewed, they have no solid subject-matter (inhalt)—no matter which of itself would be a real substance (gehalt). The subject-matter which is looked for in logical forms is nothing else than a firm foundation and concretion of these abstract determinations; and such a substantial essence is usually sought for beyond the bounds of the science. But the logical reason is itself the Substantial or Real matter, which unites in itself all abstract determinations, and is their solid absolute concrete unity. There was no need then to look far for a subject-matter, as it is usually called; it is not the fault of logic if it appears empty, but it is the fault of the way of considering it.'

'In forming judgments and conclusions, when the operations are especially referred to and grounded on the quantity of the notions, everything rests in an external difference, in a mere comparison, and becomes a pure analytical process and calculation void of all ideas. The deduction of the so-called rules and laws of conclusions in particular, is not much better than a handling of sticks of different lengths in order to sort them out and tie them up according to their magnitude—nothing else than the child's game of selecting and putting together the pieces of a picture which is composed of parts. This exercise of thought has accordingly has hardly been compared with arithmetic, and arithmetic has been compared with it. In arithmetic, numbers are considered independent of any notions, as something which, independent of their equality or inequality, that is independent of their absolute external relation, has no signification, as something which neither in themselves nor in their relations express a thought. When it is mechanically ascertained that ¾ multiplied by ⅔ make ½, this operation contains just as much and just as little thought as the ascertainment whether in a given figure this or that conclusion can be made.'

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* Dr. Whately says, 'The third operation of the mind, namely, reasoning (or discourse) expressed in words, is *argument*; and an argument, stated at *full* and in its regular *form*, is called a syllogism; the third part of logic treats of the *syllogism*.' The other two parts, which are briefly y Dr. Whately, are—c. 1, 'Of the operations of the mind and of nd c. 2, 'Of propositions,' but they are very incomplete, and, as we y deficient in logical precision. There is a Supplement to c. 1.

Hegel remarks, that with respect to the formation of an individual mind, logic may be compared with grammar. Both logic and grammar are something different for him who first approaches them and science in general, and for him who comes back from the sciences to them. He who begins to learn grammatical forms and rules, sees in them nothing but themselves: he who has mastered a language, and compares it with other languages, is in a capacity to understand the full force of these rules and forms. Through the grammar he can reach the expression of the mind, the logic. The case is the same with a man's first introduction to logic: its signification is limited to itself. Logic must be first learned as something which a man comprehends and understands, but in which extent, depth, and further meaning are not discovered. It is not till we have a deeper acquaintance with the other sciences that the logical becomes for the mind, subjectively, not a mere abstract universal, but a universal which comprehends within it the abundance of the particular: just as the same moral maxim in the mouth of a youth, even if he understands it correctly, has not the signification and the comprehensive meaning which it has in the mind of a man of long experience, to whom the words convey the full force of the expression. Thus the logical cannot be fully estimated until it is made the result of experience in the sciences: it then presents itself to the mind as the universal truth, not as a particular knowledge co-existent with other matter and realities, but as the essence of all other knowledge.

'Logic has been defined (by Hegel) as the science of the pure thought, which has for its principium (princip) the pure knowledge (wissen); not an abstract, but a concrete living unity; and concrete in this way, that in it there are inseparably opposed to one another the consciousness of a subjective self-existence, and a second such existence, an objective; and that existence is known as a pure Notion in itself, and the pure Notion is known as the real existence. These then are the two moments which are contained in the logical. But they are only known as existing inseparably, and not each in the consciousness as existing by itself; but it is only by virtue of their being also known as different (yet not self-existing) that their unity is not abstract, empty, and inactive, but concrete.

'That unity constitutes the logical principium (princip) as the element, so that the development of this difference, which is always in it, takes place *within* this element. Thus the entire notion is to be considered in the one case as existing Notion, in the other as Notion simply; in the former case it is notion by itself of reality or existence; in the latter it is notion as such, self-existing notion.

'Logic will therefore be divided into the logic of the notion as existence, and of the notion as notion; or, to make use of the common though very indefinite and ambiguous expressions, into the objective and subjective logic.

'Consistently with the fundamental element of the unity of the notion in itself, and the connected inseparability of its moments, these moments must be viewed also in their mutual relations, so far as they are different, and so far as the notion is considered with respect to a difference. Hence arises a sphere of Mediation (vermittlung), or of the notion as a system of reflective determinations, that is, of the existence passing into the internal existence of the notion, which, in this way, is not viewed as such *by itself*, but is affected by the immediate existence as by a thing properly external to itself.' This is the doctrine of the essence (wesen), which stands between the doctrine of existence and of the notion; but in the general division of Hegel's work it is placed under the objective logic, inasmuch as, though the essence is certainly the Internal, yet the character of the subject is expressly appropriated to the Notion.

Hegel's division therefore is into the objective and subjective, or, more distinctly, into:—

1. The Logic of Existence (Die Logik des Seyns).
2. The Logic of Essence (Die Logik des Wesens).
3. The Logic of the Notion (Die Logik des Begriffs).
(*Wissenschaft der Logik*, erster band. 1812.)

It may be useful to shew in a general way what the Organon of Aristotle, as we now have it, contains. The name Organon, or Instrument, was not given by Aristotle, but is of a date posterior to him.

The following synopsis is given by Giulio Pace, in his edition of the Organon:—

Logic is conversant about the Syllogism. Accordingly the Organon explains.	1. The Parts of a Syllogism.	With reference to primary Notions	THE CATEGORIES.
		With reference to secondary Notions	ON INTERPRETATION.
	2. The Syllogism.	Generally	THE PRIOR ANALYTICS.
		Specially. Demonstrative	THE POSTERIOR ANALYTICS.
		Specially. Dialectic	THE TOPICS.
		Specially. Sophistic	ON SOPHISTIC ELENCHI.

With this tabular view the following general description of the contents of the Organon of Aristotle, by an able writer, will be intelligible. 'The incorrect notions which have prevailed and still continue to prevail in regard to the "nature and province of logic," are, without detraction from his merits, mainly to be attributed to the example and authority of the philosopher himself. The book of *Categories*, as containing an objective classification of real things, is metaphysical, not logical. The two books of *Posterior Analytics*, as solely conversant about demonstrative or necessary matter, transcend the limits of the formal science; and the same is true of the eight books of *Topics*, as wholly occupied with probable matter, its accidents and applications. Even the two books of the *Prior Analytics*, in which the pure syllogism is considered, are swelled with extralogical discussions. Such, for example, is the whole doctrine of modality of syllogisms, as founded on the distinction of pure, necessary, and contingent matter; the consideration of the real truth or falsehood of propositions, and the power so irrelevantly attributed to the syllogism of inferring a true conclusion from false premises; the distinction of the enthymeme through the extra formal character of its premises, as a reasoning from signs and probabilities; the physiognomic syllogism, &c. &c. The same is true of the book on *Interpretation* (περὶ Ἑρμηνείας); and matters are even worse with that on *Fallacies* (*Sophistic Elenchi*). If Aristotle therefore did more than any other philosopher for the progress of the science, he also did more than any other to overlay it with extraneous lumber, and to impede its development under a precise and elegant form. Many of his successors had the correctest views of the object and scope of logic; and even among the schoolmen there were minds who could have purified the science from its adventitious sediment, had they not been prevented from applying their principles to details by the implicit deference then exacted to the precept and practice of Aristotle.' (*Edinburgh Review*, April, 1833.)

It may indeed be strongly suspected that the various treatises which compose the Organon contain interpolations. Further, what we now have are only a part of the logical works of Aristotle; and even this part does not exhibit simply a logical system, properly so called, but rather a system of argumentative discourse.

We may remark of the Categories that attempts have been made to found a philosophical system upon them, as explained by Aristotle. They contain, as is observed by Dr. Whately, the explicit statement that though a primary substance signifies a particular thing, as 'a particular man,' 'a particular horse,' the general term 'man' or 'horse' (which he calls a secondary substance) only *appears* to denote a particular thing, but in fact does not; for the thing is not one, as in the case of a 'particular man,' but is said of many (v. 16, ed. Pac.). This is a clear statement that general terms do not indicate realities, but are only the expression of the mode in which the mind is affected.

In the Prior Analytics it has been stated that the pure syllogism is considered: the introductory chapter of the First Book states in a general way the objects of the science as conceived by Aristotle, and is expressed with his characteristic clearness.

'It is proper,' says Aristotle, 'first to state about what the inquiry is, and to what the inquiry belongs, namely, demonstration and demonstrative science. Then we must define Proposition (πρότασις), Term (ὅρος), and Syllogism (συλλογισμός); and what is a perfect and what an imperfect syllogism. Next, what is meant by one thing being or not being in the whole of another, and what we mean by a thing being predicated of all or none. A proposition then is a sentence (λόγος) which affirms or denies something of another thing; and this either universally, or particularly, or indefinitely. By universally, I mean where it applies to all or none; by particularly, where it applies to part or not a part, or not to all; and by indefinitely, where it applies, or does not apply, without anything being determined as to the whole or part. The demonstrative (*ἀποδεικτική*) proposition differs from the dialectic (*διαλεκτική*). The demonstrative is an assumption of one side of the question, namely, the contradiction; for he who demonstrates does not interrogate, but he assumes; but the dialectic is an interrogation as to the contradiction.[*] This however makes no difference with respect to the syllogism in either case, for both he who demonstrates and he who interrogates syllogise by assuming something to be predicated or not to be predicated of another thing. Consequently a syllogistic proposition will be simply an affirmation or denial of one thing with respect to another, in the way already mentioned; and a proposition will be demonstrative if it is true, and obtained by means of the original hypothesis. A dialectic proposition is, with respect to the question, an interrogation about denial; but to him who syllogises it is the assumption of that which is apparent and probable, as it is shown in the Topica. What then is a proposition, and in what respect a syllogistic, demonstrative, and dialectic proposition differ, will be accurately stated in what follows (in the 'Analytica Posteriora'); but for the present purpose what has been already said is sufficient.

'I call Term that into which a proposition is resolved, as the predicate (*τὸ κατηγορούμενον*), and that of which predication is made, with the addition or not of 'being,' or 'not being.' A syllogism is discourse, in which certain things being laid down, something different from these things necessarily results by virtue of these premises (*τῷ ταῦτα εἶναι*). And I mean by the words 'by virtue of the premises,' that this something results by reason of them (*διὰ ταῦτα*): and 'by reason of them' means that no other term is needed in order to this necessary result. Now, I call that a perfect syllogism which requires nothing else besides what is assumed or granted in order that the necessary conclusion may appear. I call that an imperfect syllogism which requires one or more things which are of necessity by virtue of the given terms, but are not assumed in the propositions. For one thing to be said to be in the whole of another, and one thing to be predicated of the whole of another, is the same thing; and I mean by predication of the whole of a thing, when one cannot conceive any part of the one thing (the subject) of which the other cannot be predicated; and the like when the predication is of no part of a thing.'

It was apparently the object of Aristotle in his so-called logical treatises, as we now have them, to make a perfect system of argumentative discourse, and not merely a logical (properly so called) system. It is probable that if all his works of this class were extant and arranged according to his own method, we should see still more clearly that the whole was not considered a logical system (as the term logic is strictly understood), but that a logical system (as the term is strictly understood) was contained in it. Whether Aristotle or any other person put the existing books of the Organon together, neither the author who conceived them in connexion with one another, nor any one else, considered them as forming a pure logical or even a pure dialectic treatise, but a treatise on argumentation. And this is clear enough from an examination of the contents of the Organon, and the remarks of Cicero (*Topica*) and his commentator Boethius, who was himself a writer on logic. Boethius, who uses the term *Logic*, informs us that the Peripatetics understood this term as Cicero understood it, and Cicero defines it to be 'disserendi diligens ratio,' or 'an exact method of argumentation.' The Peripatetics, he adds, understood logic to consist in invention and judgment; but the Stoics, who neglected invention, considered it to consist in judgment only, which they distinguished by the name of dialectic. Thus the logic of the Peripatetics was larger than the logic of the Stoics. The logic of the Peripatetics consisted, first of topic or invention, which teaches the method of easily discovering arguments; and Boethius remarks that Aristotle in his 'Topica' treats of the 'maximæ propositiones' (called *loci*), which are universal propositions, of undoubted truth, which need no demonstration, or probable propositions, and from which we descend to the conclusions of the syllogism. Judgment is more particularly exercised in making conclusions (in colligendi ratione), but inasmuch as all argumentation and syllogising depend on and are constructed of propositions, we have to consider both the matter of propositions and their connection. As to the *matter*, we have to consider whether the propositions are true, or necessary, or probable, or sophistical. As to the connection, we have to consider the union and the composition of the propositions, which may be called the *form* of the arguments. Logic then consists of invention, and of the conclusions from invention, or the form of the argumentation. The part which treats of invention supplies the instruments or means for invention, and, as already observed, is called Topice. The part which relates to judgment supplies certain rules for discerning or separating (discernendi), and is called Analytice: so far as it treats of the connection or union of propositions, it is called Analytice Prior; so far as it treats of the inventions themselves, it is called Analytice Posterior, when it is engaged about discerning necessary arguments; but when it is engaged about false and deceptive arguments (cavillatoria), that is, sophistical, it is called the Elenchi. Boethius then concludes that Aristotle treated of logic in a more complete manner than the Stoics, 'since he treated of the two things besides which there is no third, namely invention and judgment, while the Stoics neglected invention and only furnished us with the instruments of judgment.'

This statement of what the logic of Aristotle was, may help to remove certain long-rooted mistakes on the matter. Dr. Whately, who confines logic to the pure syllogism in his theoretical view of the subject, though not in his practical exposition of it, says that 'with the exception of Aristotle, hardly a writer on logic can be mentioned who has clearly perceived, and steadily kept in view throughout, its real nature and object.' And he remarks that even Aristotle is *not entirely* exempt from the error of mistaking the nature of logic and extending it to subjects with which it has no proper connection. Now the fact is that Aristotle's logic, being what we have here explained it to be, is a very different thing from what it appears to be considered to be by many. To say that Aristotle is *not entirely* exempt from the error above mentioned is rather a singular expression, when three-fourths of his Organon have nothing at all to do with the pure syllogism. In fact Aristotle's Organon, and his logic as explained by Boethius, are much more like Watts's much-abused 'Right Use of Reason' than like what many modern writers take them to be.

There is a short but not a satisfactory account of the contents of Aristotle's Organon by Dr. Thomas Reid, Edinburgh, 1806. It may however serve to give the reader some notion of the contents of the work. The best account of it is said to be by Barthélemy St. Hilaire, *La Logique d'Aristote*, 2 vols. 8vo.

The controversial tone of this article, in a work of this description, may require a word or two of apology. Until the limits of Logic are better defined, the subject must be controversial, for the question What is Logic? must continually recur. The work with reference to which these remarks are chiefly made has long had a great circulation, and has taken the place of former treatises, which is a sufficient reason why the errors of that work, if such they be, should be pointed out. In various parts of his work, Dr. Whately has explained with sufficient precision what he considers Logic to be: he has in fact defined it as the pure syllogism, irrespective of all material considerations. But in the execution of his plan he continually perplexes the reader with considerations as to the matter of propositions and terms; and he transcends the narrow limits within which the science, as he understands it, is confined. It cannot be supposed that a writer, however able, can so far deviate from a scientific method without serious prejudice to his work.[*]

Two reviews of Dr. Whately's treatise have fallen under our notice, one of which appeared in the 'Westminster

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[*] *Τὴν διαλεκτικὴν ἐπιστήμην οὖσαν τοῦ ὀρθῶς διαλέγεσθαι περὶ τῶν ἐν ἐρωτήσει καὶ ἀποκρίσει λόγων.* (Diog. Laert., *Zeno*, vii., s. 84.)

[*] The edition of Dr. Whately's 'Logic' referred to in this article is the fourth. The writer did not know that there was a sixth, which contains some few alterations, till this article was ready for the press. The reader should refer both to the fourth and to the sixth editions.

Review,' for January, 1826; the other in the 'Edinburgh Review' for April, 1833. The former shows that Dr. Whately is not alone in some of those opinions which we consider erroneous. The latter is from a master-hand, who is well acquainted with both ancient and modern writers on logic and philosophy. To this article we are much and deeply indebted.

Several treatises on logic have appeared in Germany, which profess to exhibit the subject according to a strictly scientific method. Among these may be mentioned Kiesewetter's 'Grundriss einer Allgemeinen Logik nach Kantischen Grundsätzen,' 8vo., Berlin, 1791.

A complete catalogue of logical treatises would be very long; and the value of the catalogue would hardly compensate for its length. Writers have formed their notions of the science with more or less precision, but have seldom, perhaps, kept within their own limits; and this is a difficulty which is inherent in the subject. If confined to the bare affirmation or negation of propositions expressed by *is* or *is not* (considered simply as determinations of quantity), and to the pure syllogism, the theory of logic is soon exhausted, and as a science it is comprised within very narrow limits. If we once transcend those bounds, we enter into a wider sphere, in which the formal logic becomes a mere word. To ascertain the full import of the words *is* and *is not* in a proposition is the highest aim of philosophy.

ORIBA'SIUS (Ὀρειβάσιος, or Ὀριβάσιος), an eminent physician and the intimate friend of the emperor Julian, was born at Sardis, the capital of Lydia, according to Suidas and Philostorgius (*Hist. Eccles.*, vii. 15), or rather, according to Eunapius (*De Vitis Philosoph. et Sophist.*), who was his contemporary, at Pergamum, a celebrated city of Mysia, and the birthplace of Galen. After enjoying the advantage of a good education, he became a pupil of Zeno, an able physician of Cyprus, to whom the emperor Julian addressed a letter still extant (*Epist.* 45.). Oribasius soon became so famous in the practice of his profession as to induce Julian, upon being raised to the rank of Cæsar, to take him with him into Gaul as his physician, A.D. 355. Eunapius seems (in an ambiguous passage) to assert that it was partly by the assistance of Oribasius that Julian was declared emperor, and says that he has given the particulars of the transaction in another of his works, which is lost. But however this may be, it is certain that they were upon the most intimate terms, as is proved by one of Julian's letters addressed to Oribasius, which still remains (*Epist.* 17), and is at the same time a monument of their superstition and pagan idolatry. When Julian succeeded to the empire, on the death of Constantius, A.D. 361, he raised Oribasius to the rank of quæstor of Constantinople (Suidas), and afterwards sent him to consult the Oracle of Delphi, whence he brought back the celebrated answer, that the Oracles had ceased to utter predictions. (Cedrenus, *Chronic.*, p. 304, ed. Paris, 1647.) Oribasius accompanied the emperor in his expedition against Persia, and was present at his death. (Philostorg., *loc. cit.*) He afterwards fell into disgrace through the envy of his enemies, had all his estate confiscated, and was banished by Valentinian and Valens. He supported his misfortunes with fortitude, and by his medical talents gained so much love and reverence, that the *barbarians* (as they are called) began almost to adore him as a god. At last the emperors, feeling their loss of his professional skill, recalled him from banishment, restored his confiscated fortune, and loaded him with favours. He was still alive when Eunapius, who was his intimate friend, wrote his account of his life, which is placed by Lardner (*Heathen Testimonies, &c.*) about the year 400 (Dionys. Petavius, *Ration.*, lib. i., p. 437, ed. Paris, 1633, fol.), and as this was more than fifty years after his attending Julian in Gaul, he must have lived to a good old age. There are in the Greek Anthology two epigrams written in honour of him (lib. i., p. 65, and lib. iv., p. 405).

He was the author, according to Suidas and Photius, of several works which are no longer extant. A Commentary on the Aphorisms of Hippocrates goes under the name of Oribasius, but it is manifestly spurious. The author, who appears to have been a Christian, quotes the Holy Scriptures, and says in the preface that he wrote his work by order of Ptolemy Euergetes. It is of little value, and was first published at Paris, 1533, 8vo., ed. Jo. Guinterius Andernacus, Lat. The Greek text, if it exists at all, has never been published.

We possess three works bearing the name of Oribasius, which are generally considered to be genuine, viz.: 1, Συναγωγαὶ Ἰατρικαί, 'Collecta Medicinalia;' 2, Σύνοψις, 'Synopsis ad Eustathium;' 3, Εὐπόριστα, 'Euporista ad Eunapium' or 'De facile Parabilibus.' The first of these works was composed, as we learn from the preface or dedication preserved by Photius, at the command of Julian while they were in Gaul together, and consisted originally of seventy books, according to Photius (*Biblioth.*, cod. ccxvii.), or, as Suidas says, of seventy-two; whence it is also called Ἑβδομηκοντάβιβλος, 'Liber LXX.' Of this large work, which consisted almost entirely of extracts from Galen and other authors, we possess rather more than one-third part, namely, books 1-15, 24, 25, 43, 44, 45, 46, 47, 48, 49, and 50.* They are extremely valuable, both as containing passages from authors whose works are no longer extant, and also as serving frequently to correct and explain different sentences in Galen's works. It would be impossible here to give anything like a complete analysis of so large a work, and perhaps this is the less necessary as it contains but little original matter; but it may be useful to give a general idea of its contents, mentioning at the same time anything that may appear especially worthy of notice. The first five books treat of Diætetics; lib. vi. contains directions about sleep, exercise, friction, &c.; lib. vii. is on venesection, arteriotomy, cupping, purging, and emetics (he says that the effects of hellebore were first tried upon dogs and afterwards upon men, and that he cured by means of it a woman afflicted with cancer); lib. viii. is about clysters, with some more remarks on hellebore and emetics; lib. ix., on climate, winds, &c., and also on external applications; lib. x., on natural and artificial baths, containing a particular account of the oil baths and oil and water baths; the five following books are on Materia Medica; the twenty-fourth and twenty-fifth books contain a complete system of anatomy and physiology, taken almost entirely from Galen's great work, 'De Usu Partium Corporis Humani.' It should here however be noticed that Oribasius is the first author who gives an account of the salivary glands, which appear to have been overlooked by Galen; at least no description of them is to be found in any of his extant anatomical works. The passage in Oribasius occurs lib. xxiv., cap. 9, and is as follows: 'On each side of the tongue you will find the orifices of the vessels called salivary large enough to admit the end of a probe; they have their origin at the root of the tongue, where there are the glands of the same nature, for the vessels arise from them in the same way as arteries, by means of which the salivary moisture lubricates the tongue itself, and all the adjacent parts of the mouth.' The above seventeen books were for some time supposed to be all that remained of the Ἑβδομηκοντάβιβλος. They first appeared in Latin about 1550, Venet., s. a., 8vo., ed. J. Bapt. Rasarius, ap. P. Manutium, Aldi F. The first fifteen books were published, Mosquæ, 1808, 4to., Gr. and Lat., ed. Matthäi, under the title 'XXI. Veterum et Clarorum Medicorum Græcorum Varia Opuscula,' &c. Of the twenty-fourth and twenty-fifth books there is a good edition, Lugd. Bat., 1735, 4to., Gr. and Lat., ed. G. Dundass, with the title 'Oribasii Anatomica ex Libris Galeni,' &c. Cocchi however published, Florent., 1754, fol., Gr. and Lat., in his edition of the collection of surgical works by Nicetas [NICETAS], two works by Oribasius, περὶ καταγμάτων, 'De Fracturis,' and περὶ ἐξαρθρημάτων, 'De Luxatis,' which he conjectured to be the forty-sixth and forty-seventh books of the συναγωγή, and at the same time he expressed his opinion that the forty-third and forty-fifth books had long been before the public under the title 'De Laqueis et Machinamentis Chirurgicis ex Heraclide et Heliodoro,' contained in 'Vidi Vidii Chirurgia,' fol., Paris, 1544, and in the twelfth vol. of Chartier's edit. of Hippocr. and Galen. Angelo Mai has lately discovered in the Vatican library part of lib. xliv., 'De Abscessibus;' lib. xlv. 'De Variis Tumoribus;' lib. xlviii. 'De Laqueis;' lib. xlix. 'De Machinamentis;' and part of lib. l., 'De Pudendorum Morbis.' These he has published in the fourth vol. of 'Class. Auctor. e Vatic. Codic. Edit.,' 8vo., Romæ, 1831. The contents of the last-mentioned books are sufficiently expressed by their titles, nor is there anything in them deserving of particular notice.

The second of the extant works of Oribasius (called σύνοψις, 'Synopsis,' and addressed to his son Eustathius) consists of nine books, which, as we learn from the preface, was composed after the former work, and is an abridgement of it. In the first book he treats of various kinds of exercise, baths, external applications, cupping, scarification, leaching, &c.; he also gives directions for choosing which vein in the arm to open in phlebotomy, and says that it is dangerous to touch the *median*, on account of the proximity of the nerve; that arteriotomy should be performed on the temples or behind the ears. He next gives (lib. ii.) a list of simple drugs with their properties; lib. iii. treats of plasters and other external medicaments; lib. iv., of materia medica; lib. v., of diseases of women and children, &c.; lib. vi., of fevers, contagion, &c.; lib. vii., of surgery; lib viii., diseases of the head, eyes, and ears, lycanthropia, and hydrophobia; lib. ix., diseases of the thorax, abdomen, kidneys, &c.; also on diabetes, in which disorder he recommends sudorifica. The Greek text of this work has never been published; a Latin translation by J. Bapt. Rasarius appeared, Venet., 1554, 8vo., ap. P. Manutium.

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* F. R. Dietz states in the preface to his 'Scholia in Hippocr. et Galen.' 8vo. (Regim. Pruss., 8vo., 1834, 2 vols.), that he discovered the same books that had been mentioned by Mai, but does not specify which they are. These he intended to insert in their proper places in the new edition of Oribasius which he was preparing for the press at the time of his death.

The third extant work by Oribasius bears the title of εὐπόριστα, 'De facile Parabilibus,' and is addressed to his friend Eunapius (though some copies in the time of Photius read *Eugenius*), at whose desire it was composed, and who is probably the author of the 'Vitæ Philosoph. et Sophist.' It consists of four books, which seem to be a short abridgement of his great work, chiefly taken from Galen, Dioscorides, and Rufus Ephesius. It genuineness is boubted by Sprengel. Of this work also the Greek text has never been published. A Latin translation by J. Sichard came out, Basil, 1529, fol., and another by J. Bapt. Rasarius, Venet., 1558, 8vo. Rasarius also published, Basil, 1557, 3 tom. 8vo., an edition of his translations of all the works of Oribasius, which are inserted in the first volume of the 'Medicæ Artis Principes,' by H. Stephens, Paris, 1567, 2 tom. fol.

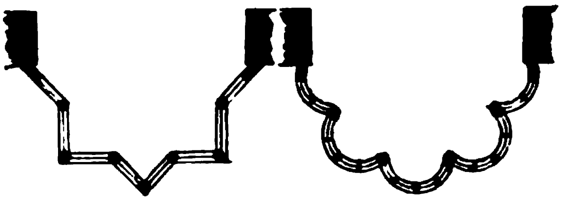
Oribasius has been called 'Galen's ape,' and it is true that he seldom contradicts him; but he has also inserted in his works so much that is original, that it is surprising that he should have confined himself to the office of a mere compiler.

ORICHALCUM, or AURICHALCUM, one of the antient names for brass. [BRASS.]

O'RICOU. [VULTURIDÆ.]

ORIEL. The origin of this term is very obscure, and has hitherto baffled all etymologists. Some have supposed it to be derived from *Oriens*, as if windows of this description were first introduced in an eastern aspect; of which there is no proof, nor indeed any probability. Others again have derived it from *orare*, through the low Latin word *oratoriolum*, signifying a small oratory or prayer-closet, to which use such bays within chambers may have been occasionally applied. The term Oriel however is thoroughly established, and the meaning now affixed to it is sufficiently clear and precise. It is applied to that particular kind of bay-window which is made to project from the upper story of a building. The distinction therefore between a bay and an oriel is this: by the former is understood a projecting window, or rather a projection pierced with window openings in its entire width, and rising immediately from the ground, whether it be confined to the lower part of the building or carried up through one or more stories above the ground-floor; by the latter, a bay which does not descend to the ground, but is suspended over the face of the wall beneath it. Oriel accordingly corresponds with the German terms *Erker-fenster* and *Chor-fenster*, which are almost the only ones of similar import in any foreign language. This absence of a name for it is accounted for by the thing itself being scarcely known in the architecture of other countries, and in our own it occurs only in our Domestic Gothic or Tudor, such form of window being very rare indeed in ecclesiastical structures. In our domestic, which also comprises collegiate architecture, it is a beautiful and valuable feature, and one which admits of very great diversity of design, and also imparts much variety and liveliness of effect to a building, more especially if there be ground-bays likewise, the two kinds of projection both harmonising and contrasting with each other.

Internally there is no distinction between Bays and Oriels, inasmuch as both the one and the other form a recess whose filled with windows. But greater variety of plan riels than in bays, which are usually more spacious dth and of shallower proportions as to depth; lso either rectangular in plan, or form three sides of an octagon, whether a regular one or not; whereas curved forms are of frequent occurrence in the plans of oriels, and are occasionally combined with straight ones. Yet as similar plans do occur in bays, no real distinction can be founded upon such accidents of design. Thornbury Castle, Gloucestershire, contains an example of a bay of very unusual character, both in respect to plan and elevation, its plan in the upper part being different from that of the lower, and in some degree projecting over it, as is indicated in the annexed figures, the first of which describes the plan of the lower, the other of the upper floor.



Though these figures will suffice to give some general notion of the forms, for a complete illustration of this singular specimen we must refer to the 'Second Series of Pugin's Gothic Examples;' merely adding here, that, considered singly, the plans have a picturesque complexity, and that such quality is greatly enhanced by their being combined.

Bays generally terminate in either a plain or embattled parapet; but oriels are for the most part made to show some sort of roof, either rising behind or resting upon the mouldings which serve as their cornice. Occasionally this roof or *crown* is rendered an ornamental part of the design, and terminated by some kind of finish. Oriels may therefore be described as consisting of three distinct parts, viz. the supporting portion, consisting of a series of mouldings, splayed off so as to come down to a point below, somewhat after the manner of a corbel (for which member we would accordingly suggest *corbel-stool* or *corbel-base* as a significant and very convenient term); 2ndly, the body of the oriel, consisting of the *window-apron* or window-parapet, and the window-openings themselves, the former of which is almost invariably panelled so as to correspond with the lights themselves, whereby the whole is made to consist of a series of panels, those in the lower range being blank or solid, the others perforated and glazed; 3rdly, the *crown* or roofing, occasionally including under that term the ornamental finish, of whatever kind it may be, above the windows, when that happens to form a conspicuous termination to the design, as is the case with the semicircular oriel at Great Chalfield, where the parapet is formed by a rich bandeau or crown of strawberry-leaf ornaments or *Tudor-flowers* with open work between them. (For drawings of this beautiful example and all its details, see Walker's *Manor-House at Great Chalfield.*)

The *corbel-stool* admits of very great variety and freedom of treatment, it being sometimes formed of few and bold mouldings and surfaces, at others of numerous and delicate ones. Neither does it invariably approach to a point at its termination, but finishes horizontally, and in some instances in a line as wide as the central division of the window. In fact there is such great diversity of design in respect both to the general form and design of the corbel-stool, that it is impossible here to enumerate all the varieties. In some oriels this part is made to assume the form either of a single or double pendant; in others the mouldings are in somewhat a similar fashion, being made to slope downwards instead of being carried horizontally. These pendant-like supports sometimes rest upon or seem to spring from armorial shields, carved heads, or other ornamental devices: neither are instances wanting of the corbelling resting upon a column or some kind of shaft, for which member the suitable denomination would be *corbel-shaft* or *corbel-stem*. In some later examples, again, of the Elizabethan period, instead of being supported beneath by corbellings, the window rests upon large trusses or brackets; windows of this description however partake very little of the character of oriels, and can hardly be described as being of the same class. Some distinctive term therefore for windows of that sort would be useful, as would likewise some others, in order to express various particulars which, for want of them, cannot be pointed out without more or less of circumlocution. The term *jutting-window* might be adopted for that species of upper window, which, although situated like the oriel, merely juts out from the surface of the wall, and forms scarcely any recess within the room. On the other hand, where a window, either bay or oriel, forms an unusually deep recess or distinct alcove to an apartment, having its ceiling detached from that room instead of being in continuation of it, such window might, as regards the interior, be very well described as a *bower*-window, which term would at once describe the difference between it and the ordinary bay; the example of the two oriels at Great Chalfield, which has been above referred to, perfectly answers to this term, as they form an alcove nearly as deep as wide, have an enriched vaulted ceiling, and are set within an arch whose mouldings serve as a frame to the whole recess.

Although no such work has hitherto been attempted, a monograph on bays and oriels might be rendered one of great interest. The materials for it are abundant, and many fine examples might be collected from various colleges at Oxford, as Balliol, Lincoln, Magdalen, All Souls, St. John's, &c.

Nurnberg also furnishes some interesting specimens of such windows, several of which are to be found in Heideloff's 'Nürnbergs Baudenkmale der Vorzeit,' including that at the Pfarrhof of St. Sebald, so greatly extolled by Dr. Dibdin on account of its bas-relief pannels.

ORIEL COLLEGE, OXFORD, was founded by king Edward II. in 1326, on the suggestion of Adam de Brome, his almoner, for a provost and ten fellows. The number of fellows has been since increased by various benefactions. Four, for the counties of Somerset, Dorset, Wilts, and Devon, were added by John Frank, master of the rolls, who died A.D. 1441; one for the old diocese of Worcester, by John Carpenter, bishop of Worcester, about the year 1476; one for the old diocese of Lincoln, by William Smyth, bishop of Lincoln, 1507; and two by Richard Dudley, chancellor of the church of Salisbury, 1529. Queen Anne, in 1713, annexed a prebend of Rochester to the provostship for ever. Several exhibitions and scholarships have been founded in this college by different benefactors, namely, three (for bachelors of arts) by Dr. Robinson, bishop of London, 1718; six by Richard Dudley, above mentioned, and Mr. St. Anthony; four under the will of Henry, duke of Beaufort, 1744; two under that of Mrs. Ludwell, 1761; and two were established by the Society, 1800. The foundation now consists of a provost and eighteen fellows, with seventeen scholars and exhibitioners.

This college took the name of Oriel from a large messuage, situated partly in the parish of St. John Baptist, in Oxford, and partly in St. Mary's parish, called La Oriole, which was granted to the provost and fellows, in 1327, by king Edward III., to which they removed at that time from the tenement in St. Mary's parish, where they had been first established. The hospital of St. Bartholomew, near Oxford, with all its appurtenances, was also granted to the college by king Edward III., at Adam de Brome's request, chiefly as a place of retirement for the Society in times of plague.

Among the eminent persons educated at this college were:—Archbishop Arundel; Reynold Pecock, bishop of Chichester in the time of Henry VI.; Bishop Butler, author of the 'Analogy;' Barclay, the translator of Brandt's 'Ship of Fooles;' Cardinal Allen; Sir Walter Raleigh; Prynne; Chief Justice Holt; and Dr. Joseph Warton.

No part of the present buildings of this college is of an earlier date than 1620, when the southern and western sides of the antient quadrangle were rebuilt. The hall and chapel, which are on the eastern side of the quadrangle, were rebuilt between 1637 and 1642. About or soon after this time, the north side was reconstructed, and made uniform with the other three sides. The hall is ascended by steps, under a semi-hexagonal porch, above which, in niches in the outer building, are statues of Edward II., Edward III., and the Virgin and Child.

Beyond this quadrangle, on the east and west sides of the garden, are two handsome buildings; that on the east was built in 1719, at the expense of Dr. Robinson, bishop of London before mentioned; that on the west, called Carter's Building, was constructed in 1729, in pursuance of the will of George Carter, D.D., for some time provost, who bequeathed his whole property to this college, partly for this purpose, and partly to purchase advowsons. In 1817 fifteen additional sets of rooms were built on the south side of Bishop Robinson's wing.

Between Carter's and Robinson's Buildings stands the library, begun in 1788, from a design by Mr. James Wyatt, one of the most chaste buildings of its kind in Oxford.

The patronage of Oriel College consists in the rectories of Ufton Nervet in Berks, Plymptree in Devon, Purleigh in Essex, and of Cromhall and Tortworth in Gloucestershire; the vicarage of Coleby and the rectory of St. Peter's Saltfleetby, in Lincolnshire; the curacy of Morton Pinckney, in Northamptonshire; the vicarage of St. Mary the Virgin, in Oxford; the curacy of Swaynswicke and the vicarage of Twiverton, in Somersetshire; the rectory of Chaldrington, alias Chelderton, in Wilts; and the vicarage of Aberford, in Yorkshire.

The number of members upon the college books, Dec. 31, 1838, was 327.

(Chalmers's *Colleges and Halls of Oxford*, vol. i., pp. 77-97; Ingram's *Memorials of Oxford*; *Oxford Univ. Calendar*, 1839, pp. 230-235.)

ORIFLAMME. [BANNER.]

ORI'GENES (Ὠριγένης), commonly called by English writers Origen, was born in Egypt in the year 184 or 185 A.D. Porphyry states that he was born of heathen parents and brought up in the Greek religion, but this is denied by Eusebius. He received instruction from Clemens of Alexandria, then a catechist at Alexandria, and at a later period he attended the lectures of the celebrated philosopher Ammonius Saccas. In the year 202 his father Leonides suffered martyrdom. Though not quite seventeen years old, Origen was hardly restrained by the care of his mother from offering himself also to martyrdom. He sent a letter to his father in prison, containing this sentence:—'Take heed, father, that you do not change your mind for our sake.' After his father's death, Origen was supported for a short time by a rich lady of Alexandria, but he soon became able to maintain himself by teaching grammar. At the age of eighteen, Demetrius the bishop of Alexandria put him at the head of the catechetical school in that city, to the duties of which office he devoted himself entirely and with great success. During this period he supported himself by the sale of his library of antient authors for a daily stipend of four oboles, which he received from the purchaser. We are not told how long this payment was continued. In his twenty-first year, having taken up the opinion that the words of our Saviour (*Matthew*, xix. 12) ought to be understood literally, he castrated himself; in later life he confessed his error in this matter. Soon after this he learned Hebrew, a thing very unusual at that time (Hieron., *De Vir. Illust.*, c. 56); but his knowledge of the language was never very great. About the year 212 his preaching reclaimed from the Valentinian heresy a wealthy person of the name of Ambrose, who afterwards assisted him materially in the publication of his Commentaries on the Scriptures. He was sent by Demetrius into Greece upon some ecclesiastical business, and on his way thither, in 228, he was ordained a presbyter at Cæsarea in Palestine. This circumstance excited the jealousy of Demetrius to such a degree, that when Origen returned home he found that prelate violently opposed to him; he therefore left Alexandria and retired to Cæsarea in 231. Demetrius held two councils at Alexandria upon this occasion, by the first of which Origen was forbidden to teach or even to appear in the city; by the second, he was deposed from the office of presbyter, and perhaps excommunicated. Demetrius moreover sent letters to most of the churches, in consequence of which Origen was condemned by the bishop of Rome, and by all others except those of Palestine, Arabia, Phœnicia, and Achaia. Jerome states that these proceedings were not taken because Origen was guilty of any heresy, but solely from jealousy of his eloquence and reputation. While Origen resided at Cæsarea, he was resorted to by persons from the most distant places, who were anxious to hear his interpretations of the Scripture. Among his disciples were several who afterwards rose to great eminence in the church. His advice was now eagerly sought for. Mammæa, the mother of the emperor Alexander Severus, sent for him to Antioch that she might converse with him on religion; and at a later period he had a correspondence with the emperor Philip and his wife Severa. At two synods which were held about this time in Arabia he again enjoyed the success, rare indeed in religious controversy, of convincing his opponents: these were, Beryllus, bishop of Bostra in Arabia, who denied the pre-existence of Christ, and some who held the opinion that the human soul dies with the body, and will be revived with it again at the resurrection. He also paid visits to the churches of Rome and Athens; the former of these visits was some time before he left Alexandria, and the object of it was, as he himself tells us, 'to see the most antient church of the Romans.' When he was sixty years old he permitted his discourses to be taken down in short-hand, and in this way above a thousand of his homilies were preserved.

It was about this time that he wrote an answer, in eight books, to the objections brought against Christianity by Celsus, a philosopher who lived in the reigns of Hadrian and the Antonines, in a work entitled 'The True Word' (Λόγος 'Αλήθης). The objections of Celsus, as they appear from the answer of Origen (for the work itself is lost), are of a frivolous and malignant character, and the work of Origen has been esteemed both in ancient and modern times, not only as a satisfactory answer to his opponent, but as one of the best apologies for the Christian religion that have been written by the antients.

In the Decian persecution (A.D. 250) Origen was imprisoned and suffered great tortures. He died shortly after his release from prison, some say at Tyre, in A.D. 253, in the sixty-ninth or seventieth year of his age.

Origen is undoubtedly one of the most remarkable men among the antient Christian writers. His talents, eloquence, and learning have been celebrated not only by Christian writers, but by heathen philosophers, including Porphyry himself. Jerome calls him 'a man of immortal genius, who understood logic, geometry, arithmetic, music, grammar, rhetoric, and all the sects of the philosophers; so that he was resorted to by many students of secular literature, whom he received chiefly that he might embrace the opportunity of instructing them in the faith of Christ.' (*De Vir. Illust.*, c. 54.) Elsewhere he calls him the greatest teacher since the apostles. We find this same Jerome however at a later period of his life violently attacking Origen and approving of the persecution of his followers. Sulpicius Severus says that in reading Origen's works he saw many things that pleased him, but many in which he (Origen) was undoubtedly mistaken; he wonders how one and the same man could be so different from himself; and adds, 'where he is right, he has not an equal since the apostles; where he is in the wrong, no man has erred more shamefully.' (*Dialog.*, i. 3.) All agree that he was a man of an active and powerful mind and of fervent piety, fond of investigating truth, and free from all mean prejudices, of the most profound learning and of the most untiring industry. His whole life was occupied in writing, teaching, and especially in explaining the scriptures. No man, certainly none in antient times, did more to settle the true text of the sacred writings and to spread them among the people, and perhaps few have introduced more dangerous principles into their interpretation. For, whether from a defect in judgment or from a fault in his education, he applied to the holy scriptures the allegorical method which the Platonists used in interpreting the heathen mythology. He says himself that 'the source of many evils lies in adhering to the carnal or external part of scripture. Those who do so shall not attain to the kingdom of God. Let us therefore seek after the spirit and the substantial fruit of the word, which are hidden and mysterious.' And again, 'the scriptures are of little use to those who understand them as they are written.'

In the fourth century the writings of Origen led to violent controversies in the church. Epiphanius, in a letter preserved by Jerome, enumerates eight erroneous opinions as contained in his works. He is charged with holding heretical notions concerning the Son and the Holy Spirit; with maintaining that the human soul is not created with the body, but has a previous existence; that in the resurrection the body will not have the same members as before; and that future punishments will not be eternal, but that both fallen angels and wicked men will be restored at some distant period to the favour of God. (Hieron., *Adv. Ruf.*, lib. ii., tom. iv., p. 403.) These opinions were not generally held by his followers, who maintained that the passages from which they were drawn had been interpolated in his writings by heretics. In 401, Theophilus, bishop of Alexandria, held a synod, in which Origen and his followers were condemned, and the reading of his works was prohibited; and the monks, st of whom were Origenists, were driven out of Alex- ia. His opinions were again condemned by the second al council of Constantinople, in A.D. 553.

The most important works of Origen were his editions of the Hebrew text and Greek versions of the Old Testament, which were the results of a diligent collation of manuscripts. The 'Tetrapla' contained the four Greek versions of Aquila, Symmachus, the Septuagint, and Theodotion, arranged in four columns. The addition of the Hebrew text in one column, and of the same in Greek characters in another, formed the 'Hexapla.' Of this great work only a few fragments remain, the best edition of which is that by Montfaucon, in 2 vols. fol., Paris, 1713. Of his other works, which were so numerous that one author states that he wrote six thousand volumes, the greater number have perished. His 'Stromata' and 'Principia' (περὶ ἀρχῶν) illustrated the doctrines of Christianity according to his peculiar method of interpretation. The 'Stromata' was in ten parts, and illustrated the doctrines of Christianity by comparing them with the opinions of the philosophers. Three fragments of this work are preserved by Jerome. The 'Principia' was in four books, but we only possess a short notice of it in the 'Myrioblon' of Photius (cod. viii.), an extract in Eusebius (*Contra Marcellum Ancyranum*, lib. i., one or two in Justinian's *Letter to Mela*, and some fragments in the 'Philocalia.' Rufinus, in the fourth century, made a Latin translation of the 'Principia,' which is still extant; but Rufinus has, by his own confession, added so much to Origen's work, that it cannot be taken as a fair exhibition of his opinions. Indeed all the extant works of Origen are very much corrupted.

We have still in Greek his treatise 'Of Prayer,' his 'Exhortation to Martyrdom,' his 'Apology for the Christian Religion,' an Epistle to Africanus, another to Gregory Thaumaturgus, and fragments of a few other epistles; part of his 'Commentaries on the Books of the Old and New Testament;' 'Philocalia,' containing extracts from his works made by Gregory of Nazianzus and Basil the Great; and in the 'Catenæ' there are many notes ascribed to Origen, which Huet however considers to be spurious. Several of his works remain in Latin translations, made by Jerome and Rufinus, but chiefly by the latter. Complete lists of his extant works are given by Huet, Cave, Basnage, Du Pin, and Tillemont, and by Fabricius in the *Bibl. Græc.*, v. i., 26. The standard edition of his whole works is that of De la Rue, in 4 vols. fol., Paris, 1733.

(Huet, *Origeniana*; Lardner's *Credibility*, part ii., chap. 38, and the authorities quoted by him; Mosheim's *Ecclesiastical History*.)

ORI'GENES, also a pupil of Ammonius Saccas, must be distinguished from the other Origen. Longinus and Porphyry mention three of his works, entitled, 'On Dæmons,' the 'Demiurgus,' and 'Galienus.'

ORIHUELA, a city of Spain, and the chief town of the district of Orihuela, in the kingdom of Valencia. It is situated in 38° 8′ N. lat. and 1° W. long., and lies on the banks of the Segura, in an extensive plain at the foot of a lofty mountain of limestone, which overhangs it precipitously on the north. This plain, or *huerta*, as it is called, is about 17 miles from east to west, and about 5 miles in average breadth from north to south. It is bounded on the north and south by ranges of hills and mountains bare of trees, on the east by the Mediterranean, and on the west by the huerta of Murcia, of which it is a prolongation. The soil is a rich clay, with a mixture of sand in some parts, resting on a stratum impervious to water. On the eastern side are many strips of sand, which the Segura has deposited in its overflowings, but these are of small moment in comparison with the exceeding fertility of the rest of the huerta, which is esteemed the richest and most beautiful in Spain. 'The orange-trees of the huerta,' says Miñano, 'besides their utility, embellish the scenery and give balminess to the air; ever charming by the brilliant green of their foliage, by the multitude and fragrance of their flowers, and by the beauty of their fruit, they form delightful orchards, alternating with groves of mulberries and other fruit-trees. Delicious is it to repose beneath these shades, where the taste, the eye, and the smell receive impressions equally grateful. The murmuring of the waters which flow through the trenches, the variety of fruits, the gaiety of the peasantry, and the purity of the sky, give rise to elevated ideas, so that some foreigners have fancied they here found the delicious spots depicted by Milton in his "Paradise Lost."' Fig and pomegranate trees, silver elms, and cypresses diversify the vegetation of the huerta, while clumps of date-palms towering above all impart an oriental character to the country. The huerta yields also abundance of hemp, flax, wheat, barley, canary-seed, lucerne, maize, and vegetables; with wine, oil, silk, and barilla, and affords pasturage to cattle of all sorts. It is deservedly called 'the Garden of Spain,' a distinction due to its delightful and salubrious climate, the industry of its inhabitants, and the abundance of water which is conveyed to every part of it by means of artificial canals, making it independent of the sky for its supply of moisture, and giving rise to the proverb—

Llueva o no llueva,
Trigo en Orihuela.
(Rain or no rain,
In Orihuela there is grain.)

The population of the huerta, which contains twenty-nine towns and villages, amounts, according to Antillon, to nearly 50,000, of whom about 23,550 belong to the city of Orihuela. The city is four leagues distant from Murcia, ten from the Mediterranean, nine from Alicante, the same from Cartagena, and thirty from Valencia. It is the see of a bishop, and its chapter comprises five dignitaries, seventeen canons, twelve prebendaries, and twelve semi-prebendaries: it has also a collegiate chapter at Alicante. Besides its cathedral, Orihuela has three parish churches, two more without the walls, and five dependent churches; nine convents of monks and three of nuns (suppressed in 1835), two hospitals, a foundling hospital, a house of refuge, a theatre, a public granary, a cavalry barrack, a post-office, and seven inns. Its institutions for public instruction are a university, connected with that of Valencia, a seminary, and two colleges, in all which education is much neglected.

The city is divided by the Segura into two parts, which communicate by two bridges. It is also divided into four wards. In form it is long and narrow, winding round the base of the mountain La Muela, which overhangs it. The streets are straight and broad, but unpaved. The public buildings are not worthy of notice, but the private houses are for the most part regular and tolerably handsome; and the general aspect of the city is cheerful and agreeable.

The inhabitants of Orihuela are noted for their superstition and demoralization; and also for their industry. Though they are for the most part agriculturists, the city has a thriving commerce, and manufactories of linens, hats, soap, and starch, some tanneries, eleven flour-mills, and more than 150 oil-mills. Its annual contribution to the exchequer is only 2790*l.*

Orihuela is one of the most ancient cities of Spain, having existed before the time of the Carthaginians. It passed from their hands into those of the Romans, Goths, and Moors successively; and in A.D. 1037 was made the capital of one of the petty kingdoms into which the khalifate of Cordova was divided. It was soon re-annexed to the kingdom of Cordova, and in 1079 was included in the kingdom of Murcia, then established by Aben Hud. It fell into the hands of the Christians in 1265, when it was taken by James I. of Aragon.

(Minano; Antillon; Laborde, *Itin. Descrip. de l'Espagne*; Townsend's *Journey through Spain*; Inglis, *Spain in 1830*; Minano, *Dicc. Geo. de España*.)

ORILLON. [Bastion.]

ORINOCO, a large river of South America, which has its origin, according to the most recent information, not in the west, but on the southern declivity of the eastern part of the mountain system called Parime, but its source has never been visited by Europeans, nor has any information respecting it been obtained from the natives. It is supposed that this river rises near 64° W. long., and between 3° and 4° N. lat. Humboldt advanced up the stream as far as the mission of Esmeraldas, and he says that some monks had penetrated several miles farther to the confluence of the river Chiguire, where the Orinoco is so narrow that the natives have made a bridge over it of creepers at the foot of a cataract. Above this fall the country is in possession of the Guaicas, a race of aborigines of rather white complexion, who prevent foreigners from advancing farther into the mountain region. Schomburgk confirms this account.

At this point the river runs in a general western direction, and several miles farther down it divides into two arms, of which that which flows to the southwest is called Casiquiare, and after a rapid course of nearly one hundred miles joins the Guainia, or Rio Negro, thus forming a natural water-communication between the Orinoco and Amazon, into which latter river the Guainia falls. [Brazil, p. 360.] The Orinoco continues a wide river, running in a western direction along the southern base of the Parime mountains, until it approaches 68° W. long., where it is joined by the Atabapo from the south and by the Guaviare from the west. From the confluence of the last-mentioned river its course lies to the north, along the western base of the Parime Mountains, and in this part its navigability is interrupted by the Raudales of Maypures and Atures, between 5° and 5° 40′ N. lat. The Raudales are a peculiar kind of cataract. The great volume of water does not descend at once from a considerable height, as in the Niagara river, nor does it traverse a narrow opening between rocks, like the Amazon in the Pongo de Manseriche, but the bed of the Orinoco at Maypures and Atures, which is nearly 8000 feet wide, is divided into numerous narrow channels by rocks and rocky islands, between which the water runs with great rapidity, and forms a succession of small cascades. The highest of these cascades does not exceed nine feet, and the river descends in about six miles only about thirty feet by all the cascades of the Raudale of Maypures. But the velocity with which the confined body of water runs in the narrow channels renders it impossible to ascend the raudale. The Raudale of Atures is only half a mile long, and of a similar description. Below these raudales the river continues to flow between low but rocky banks. Opposite the mouth of the river Meta, which joins it from the west, is a powerful whirlpool round an isolated rock, called the Stone of Patience, from the circumstance of its generally taking two days to pass it at low water.

Some distance farther down the whole bed of the river is narrowed by rocks, which advance into it from both sides, and the stream flows rapidly through the Narrow of Baraguan, which is 1893 yards wide. But before it reaches the mouth of the Apure river it leaves the rocky country, and no other impediment to navigation occurs, except the Boca del Infierno, near Muitaco, a whirlpool produced by a ledge of rock, which however does not cross the whole bed of the river, nor prevent vessels of three hundred tons burthen from ascending as far as the mouth of the Apure. From the junction of the Apure the course of the Orinoco lies eastwards to the point where it empties itself into the Atlantic Ocean. In this part of its course the navigation for boats is rendered dangerous by the floating rafts, which consist of forest-trees torn from their natural seat by the inundations of the river, and covered with aquatic plants. Near the town of Angostura the river again runs between rocks for a short distance, but though in one place it is not more than 710 yards wide, this narrow (Angostura) may be passed without danger. Below Angostura vessels of considerable burthen may ascend the river with the trade-wind, which blows constantly from November to May, but it is necessary to avoid the numerous sand-banks, which are dangerous when the water is low, especially after the month of January. These sand-banks are also subject to changes.

Several islands occur in the Orinoco below Angostura. They are generally of moderate size, partly low and partly rocky. The rocky islands belong to the Parime Mountains, along the northern base of which the river flows in the lower part of its course. About 130 miles from its mouth the delta of the Orinoco begins. The river sends off to the north a branch, which soon divides into a great number of other branches, all known by the general name of Bocas Chicas (small mouths). They are all narrow when compared with the principal branch of the river, called Boca de Navios, but most of them are deep enough to admit vessels of considerable size. Of late these branches have been much frequented by smugglers, but they can only be navigated under the guidance of the Indians who inhabit the islands of the delta, and who are well acquainted with the numerous channels which the river has formed in the soft alluvial soil of the delta. The Bocas Chicas empty themselves partly into the Atlantic and partly into the Gulf of Paria, between the continent of South America and the island of Trinidad. Ten of them are rather large rivers: their names, enumerating them from east to west, are Caño de Lauran, Caño de Nuina, Caño Chico de Mariusas, Caño Grande de Mariusas (navigable), Caño de Macareo (navigable), Caño de Cucuina (narrow, but deep), Caño de Pedernales (navigable), Caño de Manamo Chico, and Caño de Manamo Grande. The three last mentioned fall into the Gulf of Paria. The Boca de Navios, or principal branch of the Orinoco, runs eastward to the ocean, and is divided for a distance of about forty miles into two channels by a series of islands which lie nearly in the middle of the stream. These channels are known by the Indian names of Zacupana and Imataca, and their eastern extremity is not quite thirty miles from Cape Barima, which is situated at the mouth of the river. Both are navigable, but that on the south, called the Channel of Imataca, though wider has less water; it is however commonly used by large vessels. Each of these two channels is more than two miles wide, and the whole width of the river, including the islands, considerably exceeds five miles. From this point farther down, the breadth continues to increase, and at the mouth, between Punta Barima on the south and the island of Cangrejos on the north, it is more than sixty miles wide. The navigable channel, which lies in the middle, is crossed by a sand-bar with seventeen feet of water, and in breadth varying from two miles and a half to three miles or a little more. Within the bar the water deepens on the side of the island of Congrejos to four and five fathoms, and the navigable channel is more than twelve miles wide. Though no arms branch off from the Boca de Navios to the south, the low country which extends from the Punta Barima to the mouth of the Essequibo river, and is watered by several small streams, is traversed by narrow natural canals called *etabbos*, which generally lie parallel to the shores of the Atlantic, and connecting the small streams, constitute an internal water-communication for small boats between the Orinoco and Pomeroon rivers.

The tributaries of the Orinoco are very numerous, and many of them have both a long course and a great volume of water. Those which join it on the left are navigable through nearly the whole of their course, and are rarely impeded by rapids; some of them are already navigated. But the rivers which fall into it on the right, originating on the elevated region of the Parime Mountains, descend from them by numerous rapids and cataracts, so as to be, at least for a great part of their course, entirely unfit for navigation. We shall only mention a few of them.

The Guaviare rises near 3° N. lat., in the declivities of the Paramo de Summa Paz, a portion of the great chain of the Andes, but the upper part of its course is not known. According to information collected from the native tribes which inhabit the adjacent country, this river, like the Orinoco, divides into two branches, of which one running south-east joins the Uapes, an upper branch of the Guainia, or Rio Negro, so as to constitute another natural water-communication between the two water systems of the Orinoco and Amazon. This branch is said to have been once navigated by a Portuguese, Cabuquena, and is accordingly called the Channel of Cabuquena. The lower course of the Guaviare does not seem to oppose any obstacles to navigation, but as no European settlements have yet been established on the banks, it is only navigated by the native tribes. It falls into the Orinoco near 4° N. lat., after a course of more than 500 miles.

The Rio Meta, which joins the Orinoco near 6° N. lat., originates with its numerous branches in the Andes east of Bogota, the capital of New Granada, and is said to be navigable for about 100 miles from that town, but it is not used. The most northern of its affluents however, the Rio Casanare, is navigated, as it originates not far from one of the most frequented mountain-passes of the Andes, that of Toxillo, which leads to the valley of the Rio Sogamozzo, north of Bogota. English manufactured goods, sent from Trinidad, are carried up the Orinoco, Meta, and Casanare, and over the mountain-pass to Bogota and the adjacent tracts. The course of the Rio Meta exceeds 500 miles, and that of the Casanare perhaps 300 miles.

The Rio Apure, which joins the Orinoco between 7° and 8° N. lat., likewise from the left, enters it by a great number of channels, and brings to it the waters of innumerable large streams, which partly originate on the eastern declivity of the Andes north of 6° N. lat., and partly descend from the southern slope of the maritime mountains of Caracas. This river receives all the waters which descend from a mountain-range more than 600 miles in length. The Apure itself rises in the Sierra de Merida, and runs more than 100 miles along its base to the south-west, and afterwards from west to east, collecting in its course all the waters which descend from the Andes. Before it joins the Orinoco, after a course of about 450 miles, it enters an extremely low and level country of considerable extent, which for several months of the year is changed into porary lake. Through this alluvial country it has cut er of channels, by which it discharges its own waters se brought down by other rivers from the maritime mountains of Caracas. Almost all the rivers descending from the last-mentioned range unite at one place, a little above St. Jayme, and form a large body of water, which, about thirty miles lower down, falls into the Apure, about fifty miles from its mouth. All these rivers are navigable through nearly the whole of their course, but are not navigated, as they drain the Llanos, a country rich in pasturage but without agriculture. The Apure itself however is navigated up to its junction with the Rio San Domingo, and the latter is then navigated to a small place called Torunos, at some distance south of the town of Varinas. The agricultural produce of the countries along this part of the Andes is thus brought down to Angostura, and thence exported to Europe.

Among the rivers which join the Orinoco from the right, only the Caroni requires to be mentioned; it drains a long valley in the Parime Mountains, rising east of the source of the Orinoco, and north of the upper branches of the Rio Branco, an affluent of the Guainia, in the Sierra Pacaraima, and running mostly in a northern direction. The current is very swift, and much interrupted by rapids; near its mouth it descends by a cataract fifteen feet high: but the wide valley through which it flows is rich in agricultural products, which include every kind of intertropical fruits and grains, and the Cascarilla del Angostura (*Bonplandiana trifoliata*). The Caroni runs more than 300 miles. The whole course of the Orinoco, so far as it is known, is estimated by Humboldt to be nearly 1300 miles, or equal to that of the Danube.

The tides are perceptible as far as Angostura, or nearly 250 miles from its mouth, in the month of April, when the river is lowest. At the confluence of the Caroni, more than 150 miles from the mouth, the water at that time rises fifteen inches. During the rainy season the Orinoco inundates the greatest part of the Llanos, or plains which lie to the north of it, and likewise a portion of the plains which extend west of its middle course to the base of the Andes. Immediately after the vernal equinox the rising of the water is perceptible: at first it rises slowly, only an inch in twenty four hours, and sometimes the river sinks again in April. It attains its highest level in July, and remains stationary from the end of July until the 26th of August, when it begins to decrease progressively, but more slowly than it increased. It is lowest in January and February. At Angostura the mean rise does not exceed twenty-four or twenty-five feet, but in the upper part of its course it rises several feet higher.

(Humboldt's *Personal Narrative, &c.*; Depon's *Voyage à la Partie Orientale de la Terre Ferme dans l'Amérique Meridionale*; Schomburgk, *London Geographical Journal*, vol. x.)

ORIOLE (*Oriolus*) the name used by Linnæus and authors generally to designate a genus of Merulidæ, which the reader will find characterised in that article. [Vol. xv., p. 123.]

Woods and thickets are the haunts of the Orioles; and there they live in pairs, congregating however for their autumnal migration. Their nests are very artificially framed, and constructed at the extremities of the branches of high trees; insects, with different kinds of berries and other soft fruits, form their food. The prevailing colour of the plumage of the males is yellow, and this character is constant in the greater number of species known. The females differ much from the males, their plumage exhibiting greenish or tarnished yellow tints; and the young in early life always resemble the females. Their moult is simple and ordinary.

Geographical Distribution of the Genus.—Asia, Africa, islands of the Indian Archipelago, and Southern and Eastern Europe.

Example, *Oriolus galbula, the Golden Oriole.*

Description.—Male—Golden yellow, a blackish brown spot between the eye and the bill; wings and tail black; a yellow spot on the quills, not far from the middle of the wing when closed; and the tail-feathers terminated with yellow; bill reddish maroon; iris red; feet bluish grey. Length rather more than ten inches. Mr. Hoy agrees with Mr. Yarrell that the male does not obtain its brilliant yellow and black till the third year.

Female.—Greenish olive above; greyish white with a yellowish tint below, where the plumage is marked by somewhat distant greyish brown short stripes or dashes disposed longitudinally; wings brown bordered with olivaceous grey, tail greenish tinged with black; yellowish beneath with a brownish black mark, somewhat in the form of an irregular V; no dark streak behind the bill and the eye.

The Young of the year resemble the female; but the longitudinal stripes of the lower parts are more numerous and deeper in colour; bill blackish grey and iris brown.

Variety, with black spots on a brilliant yellow ground.

This is supposed by Belon and others to be the Χλωρίων of the Greeks; *Galgulus, Vireo*, and *Oriolus*, Lat., and the *Picus* of which Pliny (book x., c. 33) speaks as suspending its nest on a twig of the topmost branches of a tree, after the manner of a cup. It is the *Beccafigo, Brusolo, Galbero, Garbella, Giallone*, and *Gravalo gentile* of the modern Italians; and *Rigogolo commune* of the *Stor. degl. Ucc.*; *Turo* of the Spanish; *Loriot, Compère loriot*, and *Oriol* of the French; *Gelbe Racke, Gelber Pirol, Der Pyrold, Wiedewall*, &c. of the Germans and Netherlanders; *Goudmerle* of the Low Dutch; *Witwall* of Willughby and Ray; and *y Fwyalchen felen* of the ancient British.

Habits, Reproduction, &c.—*The Golden Oriole* is, upon the whole, a shy bird, haunting lonely groves and thickets on the skirts of woods, excepting in the fruit season, when it always frequents orchards, to the no small loss of the owner. It is difficult to get near them, though they are sometimes approached by the sportsman under the deception of his imitative whistle; but it requires great accuracy both of lips and ear to perform this fraud, for the least mistake, or one false note, will send the bird off at once. The food consists of insects and their larvæ, berries, and fruits, among which figs, grapes, and cherries are favourites. The whistle of the oriole is loud but flute-like, and Bechstein expresses the sound by the word *puhlo*. The cup, or rather saucer-shaped nest, is formed of wool and slender grass-stems, and placed in the fork of a branch, usually towards its extremity. The old French quatrain says,—

'[illegible]
[illegible]
[illegible]
[illegible]'

Nest of Golden Oriole.

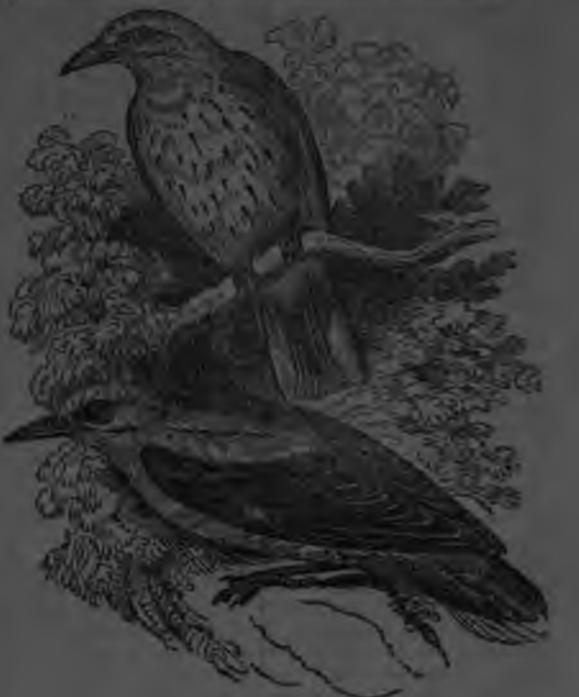
The eggs are generally four or five, purplish white with a few ash-grey and claret spots; and the female watches over them with such maternal care, that it is said she will suffer herself to be taken rather than abandon them. In this country nests have been taken in Suffolk and Norfolk.

Geographical Distribution.—Sweden, where it occasionally breeds; some of the districts of Russia, Germany, Holland, France, Spain, and Italy; Malta (on the southward migration to Africa); Greece, Egypt, Tunis, Tripoli, and the whole north coast of Africa; Trebizond, and Smyrna. In a note to Pennant's *British Zoology*, by J. L., it is stated that it is common in India under the name of *Pilluck* or *Peelach*, and that drawings of both sexes were sent from India to Lord Valentia; but these were probably specimens of *Oriolus aureus* so often received from India, a species which though in some degree like the *Oriolus galbula*, is distinct from it.

In our own country the *Golden Oriole* has been found in Hampshire, Devonshire, Cornwall, near Manchester, near Lancaster, near Welton in Surrey and near Godalming, at Cheshunt (Herts), near Saxmundham in Suffolk, in Norfolk, at Tynemouth in Durham, and in South Wales. It has been seen, though rarely, in Ireland, but never, as far as we can learn, in Scotland.

The bird can only be considered as an *occasional* summer visitor in Britain, where it first appears in *April*, returning in September. The Prince of Musignano states (*Specchio Comparativo*) that it arrives near Rome in the spring, and departs in the autumn.

Utility to Man.—The Golden Oriole gets very fat after its summer feed of fruits. Willughby saw many of them in the poulterers' shops at Naples, and says that 'it hath very delicate flesh, and yields wholesome nourishment.'



Golden Oriole.
Lower figure, male; upper figure, female.

ORIOLI'NÆ. [Merulidæ, vol. xv., p. 123.] Mr. Swainson states that the *Oriolinæ* live in small flocks, fly well, and frequent high trees, among the foliage of which they seek for caterpillars, soft insects, and fruits. (*Classification of Birds*, vol. ii.)

ORI'ON (Constellation). We have already noted the appearance which the Greek astro-mythological system has of being an application of existing fables to a subdivision of the stars derived from the East, mixed perhaps with the Oriental allegories, imperfectly understood. The trivial character of the myths by which the Great Bear and Orion, perhaps the two most remarkable constellations in the heavens, are accompanied, is enough of itself to upset any claim to high antiquity for the system above noted. We owe this brilliant cluster, according to Hyginus (of whose two or three very slight stories this is the most striking), to the fraternal solicitude of Apollo that his sister Diana should remain unmarried, or at least that she should not marry one Orion, a son of Neptune according to some, or of a rather curious parentage according to others. The deity above mentioned, when persuasion had failed, hit upon a method of preventing his sister's match, as follows. He asserted that she could not hit a black object which appeared in the sea at a distance; and she, being a good markswoman, showed him immediately that she could. This black object however was the head of her lover, who was swimming at the time; and the end of it was that, according to custom, he was immediately gazetted as a constellation, with his club and lion's skin.

Orion is surrounded by Eridanus, Canis Major, Gemini, Auriga, and Taurus. The position of his belt, with respect to Aldebaran and Sirius, and the proximity of Procyon, Castor and Pollux, the Pleiades, &c., render it difficult to forget and unnecessary to describe this part of the heavens. The list of stars is as follows: α and β, of the first magnitude, were frequently called Betelguese or Betelgeux, and Rigel, corruptions from Arabic names; γ was called Bellatrix.

Character.	No. in Catalogue of		Magnitude.	Character.	No. in Catalogue of		Magnitude.
	Flamsteed.	Astron. Society.			Flamsteed. (Piazzi.) (Bradley.)	Astron. Society.	
π¹ *	1	556	4	c¹	42	680	5
π²	2	558	4	θ²	43	681	4
π³	3	560	4	ι	44	682	3½
o¹	4	563	4½	ε	46	686	2
	5	565	6	ω	47	691	5
g	6	567	6	σ	48	690	4
π⁴	7	569	6	d	49	693	5
π⁵	8	568	4	ζ	50	698	2
o²	9	571	4½	b	51	700	5
π⁶	10	579	4½		52	710	6
y¹	11	589	5	κ	53	713	3
i	14	601	5	χ¹	54	729	5
y²	15	604	5		55	725	6
h	16	605	6		56	726	6
ρ¹	17	614	4½	χ²	57	731	5
	18	620	6	α	58	734	1
β	19	619	1		59	740	6
τ	20	625	4	B	60	742	6
	21	628	6	μ	61	747	4
ο	22	635	5	χ³	64	748	6
m	23	639	6	χ⁴	65†	750	6
γ	24	648	2	C	66	752	6
ψ¹	25	646	5	ν	67	757	4½
p	27	645	6	E¹	68	768	6
η	28	647	3	f¹	69	771	6
e	29	644	5	ξ	70	772	4½
ψ²	30	653	5	E²	71	777	6
l	31	660	6	f²	72	778	6
A	32	662	5	h¹	73	780	6
n¹	33	664	6	h²	74	783	6
δ	34	665	2	l	75	785	6
u	35	670	7	D¹	77	802	6
υ	36	668	4	D²	78	803	6
φ¹	37	676	5	y³	(1)	609	6½
n²	38	675	6		(178)	694	6
λ	39	677	4		(328)	755	7
φ²	40	685	5		[729]	617	4
θ¹	41	679	6				

ORISSA. [HINDUSTAN.]

ORISSAN LANGUAGE. [HINDUSTAN, vol. xii., p. 227.]

ORITHY'IA. (Crustacea.) [OXYSTOMES.] Orithyia, or Orythia, as it is incorrectly written, is also the name for a genus of Medusarian Pulmogrades. [PULMOGRADA.]

ORIZONTE. The name of this artist was John Francis Von Bloemen, but the Bentvogel Society, consisting of Flemish painters resident at Rome, gave him the name of Orizonte, from the hot and vapoury air of his pictures, it being their custom to give to every new member, on his introduction, a name expressive either of any perfection or defect in his figure and countenance, or some peculiarity in his style, or singularity in his character. Orizonte was born in 1656, at Antwerp, but studied and always resided in Italy. The palaces of the pope and of the nobility at Rome possess abundance of his works, both in fresco and oil. The composition of his landscapes and the character of his trees are almost always in the style of Poussin; but the general tone is a dark green with a cast of red. His selection of subjects is always picturesque, and the pencilling bold; but his pictures are not always equally finished. As he advanced in age his style degenerated into mannerism, but his originality will always entitle him to a place in the first rank of landscape painters. He died in 1740, at the age of eighty-four.

ORKNEY ISLANDS, THE, are a group of islands belonging to Great Britain. They are situated north of the north-eastern extremity of Scotland, between 58° 44′ and 59° 24′ N. lat., and between 2° 22′ and 3° 25′ W. long. They are divided from the mainland of Great Britain by the Pentland Frith, which is 5½ miles wide at its eastern entrance between Duncansby Head and Borough Point in the island of South Ronaldsha. The flux and reflux of the water during the run of the tides through this strait is broken by the Pentland Skerries, which lie a little more than 4 miles to the north-east of Duncansby Head, and 2½ miles south of the island of South Ronaldsha; and farther westward by the islands of Swona and Stroma, the latter of which lies within 1½ mile of the shore of Caithness. A strong current is thus produced running at the rate of from three to nine miles an hour in various parts of the Frith at one and the same time; a circumstance which causes so much sea in gales of wind as to render the strait very dangerous to deep-laden vessels. There are two lighthouses erected on the Great Pentland Skerry, and another on Dunnet Head, on the south side of the western entry to the Frith, with the assistance of which the strait may be navigated with comparative safety in moderate weather.

The group consists of 67 islands and islets, 27 of which are inhabited; the remainder, called *holmes*, are only visited during the summer for the preparation of kelp or as pasture-grounds. The largest of these islands, called Pomona, or Mainland, extends from south-east to north-west, about 18 miles, and divides the group into two portions. The islands between Pomona and the mainland of Great Britain are called the South Isles, and those north of Pomona the North Isles. Eight of the South Islands and three Skerries and fifteen of the North Isles are permanently inhabited. They contained in 1831 a population of 28,847, viz.:—

South Isles.	Inh.
Swona and Pentland Skerry	89
South Ronaldsha	2,265
Burra	357
Flota and Fara	369
Hoy	1,388
Gremsay	225
Copinshay	7
Pomona, or Mainland	15,787
Hunda	5
North Isles.	
Shapinsha	809
Gairsa	69
Weir	93
Egilsha	228
Rousa	921
Enhallow	20
Eda and Fara	756
Stronsa, Papa Stronsa, and Lingholm	1,07[illegible]
Sanda	1,839
North Ronaldsha	522
Papa Westra	330
Westra	1,702
	28,847

Some of the islands have rocky shores presenting abrupt precipices towards the west, and rise in low rounded hills covered with heath, and with a considerable depth of peat-mould. Others are low and flat, with sandy shores. There are no trees on any of the islands, with the exception of a few of small size in the neighbourhood of the town of Kirkwall, although at some remote period they would appear to have been covered with wood, from the numerous remains found imbedded in the peat mosses.

The geological character of these islands is very simple; the whole group, with the exception of a small granitic district near Stromness, consisting of rocks belonging to the old red-sandstone formation. The prevailing rock is a species of sandstone flag, much charged with argillaceous matter. It occurs in distinct strata, usually slightly inclined, forming hills of small elevation inland, which however often present very magnificent cliffs round the coasts. The colour varies from pale greenish to blackish grey. Occasionally it contains bitumen, and it is the repository of remarkable fossil fishes.

Connected with the sandstone flag are beds of common sandstone of a yellowish or tile-red colour. It forms the chief part of the mountains of Hoy, the highest point in Orkney, and also several headlands in Pomona and Eda. Dykes of basalt and greenstone traverse these rocks in Hoy

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* π¹, π², π³, π⁴, π⁵, and π⁶ of Bayer are g, π¹, r, π², s, and t in modern catalogues.

† So marked by Flamsteed, and denoted by ¹, it should have been 63.

[illegible], &c., and a bed of basalt was noticed by Dr. Traill in Hoy.

The granite tract appears in the form of a chain of moderate hills, occupying a length of six miles, and a breadth of from one to half a mile, and ends at Stromness. It is everywhere in immediate contact with a coarse conglomerate, consisting of nodules of quartz, and fragments of gneiss and sandstone, imbedded in an arenaceous base. The gneiss, conglomerate, and sandstone flag, above mentioned, strikingly resemble the corresponding rocks in Caithness and Sutherland. Fossil fishes occur rather plentifully in Pomona, in the lower beds of a quarry of sandstone flag. The fishes from Caithness and Orkney approach one another very nearly, but among the latter are several new species and even genera. Two of the most remarkable are named, by Agassiz, Chiracanthus and Cheirolepis. (Traill and Agassiz, *Reports of the British Association for 1834*.)

According to a rough estimate, the surface of the islands is [illegible] acres, of which less than one-third is cultivated and used as pasture; the remainder is a waste or covered with water. The island of Sanda, which is flat and low, is the most fertile, and accordingly is called the granary of the Orkneys. Ward Hill, on the island of Hoy, has an elevation of 1555 feet, and is considered the highest land in the islands; Wideford Hill on Pomona also rises to a considerable elevation. The coasts of Pomona and the South Isles are very irregular in their outline, and contain several safe and spacious harbours.

As the Orkneys lie open to the wide expanse of the Atlantic and are exposed to the western gales, which are the prevalent winds, the climate is rather wet than cold. Frost rarely continues for several days in succession, and the harbours are open all the year round. The winter is disagreeable on account of the frequent rains, sleet, and storms, and it is usually prolonged far into the spring, which season also is very damp. The summer is generally fine and pleasant, the heat being very moderate and the weather steady. The early part of the autumn is likewise agreeable, but in November the bad weather commences.

The soil of some of the islands is of inferior quality, but that of others is excellent. Agriculture is limited to the raising of oats, and that kind of barley which in Scotland is called bear, or bigg, and to the cultivation of potatoes, turnips and a few other vegetables. Owing to the proprietors having turned their attention for many years exclusively to the kelp manufacture, agriculture has been greatly neglected; but of late great improvements have taken place, and the opening of a regular steam communication with Aberdeen and Edinburgh has given a great stimulus to the raising of green-crops and rearing of cattle, for which the islands are peculiarly adapted. Owing to the wetness of the climate and the lateness of the summer, wheat is not found to answer, but oats, barley, and big or bear, are exported in considerable quantities. Cattle are numerous, but small; on several of the larger farms the Angus and short-horned breeds have been introduced with success. Horses are abundant, but small. Sea-fowl abound on most of the smaller islands. Many families subsist entirely on the produce of their fishing; cod, herrings, and lobsters abound along the coast, and seals are common. It has been conjectured that the islands derive their name from the seal, ork, in the language of the Northmen, signifying a seal. A few years ago the inhabitants derived a great profit from the preparation of kelp. But for the last five or six years the manufacture has been almost extinct, the article having been quite superseded in the soap and glass works by the carbonate of soda made from common salt. During the war the price of kelp has been as high as 20*l.* a ton, and for many years it was never below 12*l.* Latterly it has sold for about 3*l.* or 4*l.* a ton, which hardly pays the labour of making it and sending to market. The little kelp which is still made is used chiefly in the preparation of iodine. Owing to the extinction of the kelp manufacture a complete change has taken place in these islands. Under the old system the mass of the population were, in all but name, serfs attached to the soil, being bound to labour at kelp-making for the landlord in exchange for a miserable cottage and little patch of land, and living from year to year without hope or prospect of bettering their condition. The failure of the market for kelp in fact emancipated them, as their labour ceasing to be valuable to the landlord, they were left at liberty to employ it in any occupation which they found most advantageous. The consequence has been a great extension of agriculture and the rise of the herring-fishery, which had been entirely neglected, into a branch of industry of great importance. Upwards of 700 boats, with six men each, and of the average value, with their nets, of 130*l.* or 140*l.*, are now employed in this fishery, and the number is rapidly increasing. In favourable years from 30,000 to 40,000 barrels of herrings are exported, and from 20,000*l.* to 30,000*l.* are divided among the fishermen and their families. The cod-fishery also, which is prosecuted in the months of May and June, before the great shoals of herrings appear on the coast, is fast rising into importance, and already brings from 5000*l.* to 7000*l.* annually into the country. The lobster-fishery is also carried on, but is of minor importance.

The inhabitants are of Scotch and partly of Norwegian descent. While the islands belonged to Norway and Denmark, many Norwegians settled on them, and their language was exclusively in use. But since the islands have been annexed to Scotland, a great change has taken place, and the Norse language has been long extinct. A few relics of the Udal tenure, the universal tenure of land among the free nations of the north, may still be found; and there are instances of families who occupy small patches of ground which have descended from father to son from time immemorial. In character, manners, and language the inhabitants of these islands now differ little from the Scotch lowlanders. They are generally intelligent, educated, and moral. The competition between the United Seceders, who constitute about a third part of the population, and the established church, has done much of late years to extend the means of education and diffuse a spirit of religious zeal. There are few parishes which have not at least two schools. The women find some occupation in straw-platting. A number of young men leave the country to enter the merchant navy, and often rise to be masters and mates of vessels, being in general sober, honest, and able to read and write. Formerly a considerable number went to America in the service of the Hudson's Bay Company, but since the junction of the Hudson's Bay Company with the North-West Company, Canadians have been exclusively employed. A few men also go every year with the whale-ships to Davis's Straits, but, owing to the rapid increase of the herring and cod fisheries of late years, the number who leave the islands in search of employment is considerably diminished.

It appears that the Orkneys were early taken possession of by the Normans, and they remained subject to the kings of Norway and Denmark till the year 1468, but had their own kings or earls, who governed them as independent sovereigns. The Orkneys were the general rendezvous of the piratical fleets which so often devastated the coasts of England and France. Rollo, the conqueror of Normandy, and ancestor of William the Conqueror, was an earl of Orkney. In 1468 the islands were pawned to Scotland for 50,000 florins, and the pledge has never been redeemed. From the year 1471 the earls of the island became dependent on Scotland, and from that time were considered like other chieftains of the Scottish clans.

Kirkwall, situated on a bay on the north coast of Pomona, is the capital of the islands. The cathedral of St. Magnus at Kirkwall is one of the most remarkable specimens of middle age architecture in Scotland; it was built by Olave, king of Denmark. It is in good repair and still used as the parish church. Close to the cathedral are the ruins of the bishop's palace, and of the palace of Earl Patrick Stewart, the last feudal earl of Orkney, who was executed for high treason in the reign of James I. The town consists of one long narrow street, but contains several good houses and shops. It has been recently lighted with gas. The population in 1831 was 3721. It has ten schools and a considerable trade in the produce of the island. In 1834, 78 vessels, of 4236 tons, navigated by 326 seamen, belonged to this port. In 1834 the shipping which left the port amounted to 8249 tons, and 10,204 tons entered. The town has some distilleries.

Stromness, situated towards the south-western extremity of Pomona, has also a good harbour. It contained in 1831 a population of 2921, and it has considerable trade: about 300 vessels annually enter the harbour.

Though there are several other good harbours, they are not used, except by fishing-boats; the best in Orkney is Inganess Bay for all classes of vessels. The principal stations for the herring-fishery are St. Margaret's Hope in South Ronaldsha and [illegible] in Stronsa. On the island of Hoy there is an excellent and spacious harbour, called Long Hope. The stewartry of Orkney and Shetland, consisting of this group and the Shetland Isles, sends one member to parliament, and the town of Kirkwall, which is a royal borough, returns a member together with Wick, Dingwall, Tain, Cromarthy, and Dornoch.

(Peterkin's *Notes on Orkney and Zetland*; Neill's *Tour in Orkney and Zetland*; Stanley's *Voyage to the Orkneys*; Sheriff's *Agricultural Report of the Orkneys*; *Various MS. Communications.*)

ORLAY, BERNARD VON, called Bernard of Brussels, was born in that city about the year 1490. He went to Rome when he was very young, where he had the good fortune to become a pupil of Raphael. On his return to Brussels he was appointed principal painter to the governess of the Netherlands, and was likewise employed for many years by the emperor Charles V.

The style of his design was noble, and his tone of colouring very agreeable. He very frequently painted on a ground of leaf-gold, especially if he was engaged on a work of importance, a circumstance which is said to have preserved the freshness and lustre of his colours: in his hunting pieces, in which he introduced portraits of Charles V. and the nobles of his court, he usually took the scenery from the forest of Soignies, which afforded him ample variety.

He was engaged by the Prince of Nassau to paint sixteen cartoons, as models for tapestry, intended for the decoration of his palace. Each cartoon contained only two figures, a knight, and a lady on horseback, representing some members of the Nassau family. These cartoons were designed in an elevated style worthy of a pupil of Raphael. The cartoons were afterwards copied in oil, by Jordaens, by the prince's order. The chapel of a monastery at Antwerp had a celebrated picture of the Last Judgment by this master: we are not certain whether it is still there, or has been lost or destroyed in the scenes of revolution and confusion of the last half-century. B. von Orlay died in 1560, aged seventy.

As this artist is, we believe, little known in England, we subjoin a few brief notices from Dr. Waagen's 'Arts and Artists in England,' respecting pictures which he saw in English collections: 'In Devonshire-house, Neptune and Amphitrite, and Cupid with the trident, a very carefully executed little picture, here ascribed to Luca Penni, but, beyond all doubt, a work of that Flemish scholar of Raphael' 'At Chiswick: 1, a female portrait, very delicately painted, kept under glass, and, without any reason, said to be Petrarch's Laura; 2, a female figure in profile, called Cleopatra, on account of a serpent on the bosom; but the expression of indifference in the fine and handsome face does not correspond with the character.' In the Liverpool Institution: a Holy Family, admirably executed, after a composition by Leonardo da Vinci. At Chatsworth: the Presentation of the Virgin in the Temple, a very rich composition, ascribed to Jan van Eyck; but many parts of which, says D. Waagen, 'strongly remind me of the admirable Bernard von Orlay.' At Keddleston Hall, the seat of Earl Scarsdale: the Virgin with the Infant Christ, who blesses St. John in the presence of Joseph and Elisabeth: the figures are three-quarters the size of life. Dr. W. says that next to the Pietà, in the museum at Brussels, this is the finest picture that he is acquainted with by this eminent master. At Lord Spencer's, at Althorpe: a bust of Anne of Cleves, very carefully painted

ORLE'ANOIS, or ORLE'ANAIS, L', one of the provinces or military governments into which, before the Revolution, France was divided. It was bounded on the north and north-east by the government of L'Ile de France, on the east by Champagne and Bourgogne, on the south east by Nivernois, on the south by Berri or Berry, on the south-west by Touraine, and on the north-west by Maine and a small part of Normandie. It took its name from Orléans, its capital [ORLEANS], and comprehended the subordinate districts of Orléanais, properly so called, chief town Orléans, pop. 40,161; Le Gatinois Orléanois [GATINOIS], chief town Montargis, pop 6781; Le Blaisois or Blésois [BLESOIS and BLOIS], chief town Blois, pop. 13,138; La Sologne, chief town Romorantin, pop. 6985; and La Beauce or Beausse [BEAUCE], which comprehended the three subordinate districts of Le Pays Chartrain [CHARTRAIN], chief town Chartres, pop. 14,139; Le Dunois [DUNOIS], chief town Châteaudun, pop. 6461; and Le Vendômois, chief town Vendôme, pop. 7771. The province of Orléanois is now divided into the departments of EURE ET LOIR, LOIR ET CHER, and LOIRET. Small portions of it are comprehended in the departments of NIEVRE, SEINE ET OISE, and YONNE. It included the three bishoprics of Orléans, Chartres, and Blois, all of which still exist. The bishops are suffragans of the archbishop of Paris.

Orléanais, properly so called, was conterminous with Beauce on the north, north-west, and west, Gatinois on the north-east and east, Sologne on the south, and Blésois on the south-west. It comprehended, besides Orléans, the towns of Beaugency, pop. 4883; Châteauneuf, pop 3160; Meung, pop. 4630; and Pithiviers, pop. 3957. It is at present included in the department of Loiret, except a very small portion which is in the department of Eure et Loir.

The district of Orléanais, in the wider application of the term, was for the most part included in the country of the Carnutes, and in the Roman province of Lugdunensis Quarta, or Senonia; a portion of it was included in the territory of the Senones, in the same province: both these were Celtic nations. It was one of those parts of Gaul which remained longest in the hands of the Romans; but after the defeat of Syagrius by Clovis, it fell into the hands of the Franks. The part south of the Loire was probably already in the hands of the Visigoths, from whom it was soon after taken by the Franks. It was probably included in the kingdom of Orléans under the sons of Clovis, and in that of Neustria under the later descendants of the same monarch. Part of it at least was included in the domains of Hugues Capet, before his accession to the throne of France, upon which event it became part of the domains of the crown.

ORLE'ANS, a town in France, capital of the department of Loiret, situated on the right bank of the Loire, 65 miles in a direct line south by west of Paris, or 71 miles by the road through Montlhéry, Etampes, and Artenay; in 47° 55′ N. lat. and 1° 53′ E. long.

Orléans is a town of considerable antiquity. We are of opinion, with D'Anville, that it was the Genabum of Cæsar, in opposition to the opinion of those who would fix Genabum at Gien. (See art. 'Genabum,' in the 'Index Geographicus,' subjoined to the edition of Cæsar in Lemaire's '*Bibliotheca Classica Latina*, Paris, 1822.) This Genabum was a trading town of the Carnutes, a Celtic people, and was the scene of the outbreak of the great revolt of the Gauls against Cæsar, in the seventh year of his command. The Carnutes, under the command of two desperate leaders, Cotuatus and Conetodunus, assembled in the town, massacred the Romans who for commercial purposes were residing there, among whom was one of the officers of Cæsar's commissariat, and despatched the intelligence with unexampled rapidity to the surrounding states. In consequence of this outrage, Cæsar, early in the ensuing campaign, attacked the town, which he plundered and burnt. (Cæsar, *De Bello Gallico*, lib. vii., c. 3, 11.) It seems to have recovered from this disaster, and in the time of Strabo, who calls it Γήναβον, was again the emporium or trading town of the Carnutes. At a subsequent period it was made the capital of a separate district, and received the name of Aureliani, as it is commonly supposed from the emperor Aurelian, but this we think very doubtful. The modern name Orléans is obviously derived from Aureliani, or, as it was written in the middle ages indeclinably, Aurelianis.

In the devastating invasion of Attila (A.D. 451) that barbarian penetrated as far as Orléans, which he besieged. The town had been strengthened with new fortifications, and was bravely defended by the townsmen and the garrison until it was relieved by the timely approach of the Romans and Visigoths under Aetius and Theodoric. Orléans subsequently passed into the hands of the Franks, and became the capital of one of the kingdoms into which their territories were so frequently divided. In subsequent centuries the town was the object of the hostility of the Saxons and Normans, the latter of whom twice captured it (A.D. 855 and 865). It was the capital of a county which was included in the territories of the dukes of France, and on the accession of Hugues Capet, who had inherited that duchy, became one of the most important places in the immediate dominions of the crown. It was at a later period (A.D. 1428) besieged by the English under the regent Bedford [BEDFORD, JOHN, DUKE OF], but the siege was the limit of their successes. They were obliged to raise it with disgrace, and never after recovered their superiority. [ARC, JEANNE D'.] At this time the town gave the title of duke to a branch of the hou of Valois, which afterwards came to the throne in the person of Louis XII.

In the religious wars of France in the sixteenth century, the prince of Condé, leader of the Huguenots, early in the struggle possessed himself of the town of Orléans (April, 1562). In less than a year (February, 1563) it was besieged by the duke of Guise at the head of the Catholics; but his assassination [GUISE OR GUYSE, DUKES OF] prevented the capture of the place. At the peace concluded soon after, it was restored to the king. In 1567 it was surprised on the renewal of hostilities by La Noue, a Huguenot captain. The capture did much injury to the cathedral and the other churches. It came afterwards again into the hands of the Catholics, and in the massacre of St. Bartholomew (A.D. 1572) a number of Huguenots, variously stated at from 500 to 1800, perished at Orléans.

The town stands in a plain gently sloping down to the river: the circuit of the ramparts, now converted into a promenade, forms an arc of a circle about two miles and a half to three miles in extent. The side of the town along the bank of the Loire, representing the chord, is about a mile and a half, and the length of the principal line of street from the entrance of the Paris road into the town on the north side to the bridge over the Loire, nearly perpendicular to the chord, is about three-quarters of a mile. Orléans is surrounded by numerous country-houses, and has large suburbs, of which that of Olivet (not to be confounded with the little town of Olivet three miles off) is on the south side of the river. Some parts of the town are well laid out, with wide and clean streets and well-built houses. The line of street from the Paris road to the bridge is on the whole the finest, especially that part which lies between La Place du Martroy (the principal square in Orléans, adorned with a coarsely executed pedestrian statue of Jeanne d'Arc) and the bridge. But the parts to the right and left of this line of street are ill laid out, ill built, and ill paved; and the buildings in the eastern part of the city are the most wretched possible. The bridge over the Loire is above 1000 feet long, and consists of nine arches, of which the centre has above 100 feet span. There is a tolerably handsome quay near the bridge; and between the bridge and the suburb of Olivet is a public walk. This suburb abounds with country-houses and with nursery-grounds.

The cathedral of Sainte Croix is one of the finest in France. It was rebuilt after its being ruined by the Huguenots. The rebuilding was commenced by Henri IV., but the edifice has only been finished (if indeed it be yet complete) since the restoration of the Bourbons. The architecture has excited much admiration, especially that of the principal entrance; and the two towers of the front are said to surpass in elegance and lightness the finest specimens of Gothic architecture. The church of St. Aignan, the finest except the cathedral, is a beautiful Gothic building, but is imperfect. The nave was destroyed by the Huguenots, and the steeple was demolished not long since. The church of St. Pierre le Puellier, the oldest in the town, is remarkable only for its antiquity. There are a town-hall; a court-house (*Palais de Justice*), a handsome modern building; a building in which is deposited the public library of above 20,000 volumes; and a plain theatre. The botanic garden is little more than a public walk.

The population of Orléans in 1831 was 40,161; in 1836, it was 40,274. The commercial prosperity of Orléans is not equal to what it was formerly. Its refining-houses for sugar were more busily engaged before the rise of this branch of industry in Paris; and the manufacture of hosiery for exportation to the Levant has also declined. The preparation of vinegar, the bleaching of wax, are still actively carried on, and blankets and cotton counterpanes are manufactured. To these articles of manufacture may be added cotton and woollen yarn, fine woollen cloths, flannels, hats, files, rasps, and other tools, glue, chamois and other leather, &c., and earthenware. There are breweries and dyehouses; and round the town are numerous nursery-grounds. The neighbourhood produces some excellent wine. Trade is carried on in the above articles, and in brandy, corn, flour, seed, saffron, fire-wood, timber, planks, coals, groceries, and spices. The navigation of the Loire, and the communication with the Seine and its branches by means of the canals of Orléans and the Loing, contribute much to the trade of the place.

There are a Cour Royale and several other judicial and fiscal government offices; an exchange, a chamber of commerce, and other institutions connected with trade; an Académie Universitaire; a society of sciences, belles-lettres, and arts; a royal college or high school; free schools for drawing, architecture, geometry, and mechanical science as applied to the arts; courses of instruction in medicine; a museum of natural history, and two large libraries. Orléans is the seat of a bishopric, the bishop of which is a suffragan of the archbishop of Paris: his diocese consists of the department of Loiret.

The arrondissement of Orléans comprehends an area of 929 square miles, and includes 106 communes: it is divided into fourteen cantons, or districts, each under a justice of the peace. The population in 1831 was 137,820; in 1836, it was 141,637.

ORLEANS NEW, the capital of the state of Louisiana, is situated on the eastern bank of the Mississippi, 104 miles from its mouth following the course of the river, and about 90 miles in a direct line from the Gulf of Mexico; in 29° 58′ N. lat. and 90° 9′ W. long. The city is in the most favourable situation for the prosecution of the trade of one of the most important parts of the North American Union, being near the mouth of the great outlet to the valley of the Mississippi. It is already the emporium of the vast region which is drained by that river, the Missouri, the Red River, and their tributaries, and in future years, when settlements shall have extended through that fertile region, New Orleans may become the greatest commercial city of the West; there is no place in Europe or America which has equal natural facilities of internal navigation. The rapidity with which the population and commerce of the city have increased during the last 20 years, and especially since the introduction of steam-vessels upon the great western rivers, has been most remarkable; and this notwithstanding the disadvantages of the place being unhealthy. The population of New Orleans, which was 17,242 in 1810, was 27,176 in 1820, and in 1830 amounted to 46,310. The number of French inhabitants is about equal to that of the Americans, but the French predominate in the old town, where many of the storekeepers are unable to speak English. There are many Spaniards, about 12,000 slaves, 3000 free persons of colour, and 14,000 strangers from all parts of the world. In 1803, when the territory was bought by the United States from France [JEFFERSON], the number of inhabitants did not exceed 10,000. New Orleans was founded by the French in 1717; it was ceded to Spain in 1763, with the rest of Louisiana; but was restored to France in 1801, and purchased by the United States in 1803.

The French language is perhaps as much spoken as the English. The principal theatre is French; it is in the old town, is large, and well attended. The American theatre is in the suburbs. Billiard-rooms, gambling-houses, and lottery-offices are in great numbers, especially in the old town. Some of the newspapers are in English, some in French, and some are half in English and half in French.

New Orleans is built in the form of a parallelogram, consisting of six complete squares, with suburbs, called faubourgs. The streets in the old city are about 40 feet wide; many of them are unpaved, but have wide and convenient footpaths. The houses near the river are of brick, but in the rear of the town many are built of wood. During the hottest months of the year the city is exceedingly unhealthy, and many of the wealthier inhabitants leave it at that season; of those who remain, a large proportion are carried off yearly by yellow fever. The climate is however more fatal to Europeans who are new comers than to natives; and perhaps in addition to the insalubrity of the place, we must take into account the dissolute mode of life of many of the inhabitants as one cause of the great annual mortality. The disease is most probably caused by the marshy nature of the soil in which the town stands, and the exhalations with which the air is consequently loaded. This disadvantage is hardly susceptible of remedy, because the city stands a few feet below the level of the Mississippi, the waters of which are kept in their channel by an artificial mound, or *levée*, which extends for nearly 100 miles along the bank. The sickly season extends through the months of July, August, and September. The musquitos are in vast numbers. Every bed in every respectable house is provided with a musquito-curtain.

The cathedral is the only public building at all imposing; it has four towers, and massive walls ornamented with figures of saints in the niches. There is a large 'Charity Hospital,' which provides liberally such articles as are needed by the sick poor, and relieves every year from 8000 to 9000 patients. There are also three orphan asylums for supporting, educating, and putting out in the world destitute orphans: two of these institutions are well endowed, and the whole are well supported by the richer inhabitants.

In the environs there are large plantations of sugar, cotton, indigo, and rice, which are cultivated in a very perfect manner. There are pomegranates, magnolias, myrtles, and the fragrance of the orange groves, when the trees are in blossom, is delicious.

A canal, opened in 1837, connects New Orleans with Lake Pontchartrain. It is 4½ miles long, and cost nearly a million of dollars. Another canal, called the Carondelet canal, connects the Mississippi with Lake Pontchartrain through the river Saint John. La Fourche Canal extends from near New Orleans to Berwick's Bay; the length, including the natural navigation, is 85 miles. A railroad, 4½ miles long, connects New Orleans with Lake Pontchartrain. This work is perfectly straight, and with a difference in the level of only 16 inches throughout: it has cost half a million of dollars, and produces an adequate return. At the terminus of this line on Lake Pontchartrain, an artificial harbour and breakwater have been constructed. The Carrolton railroad connects the city with Carrolton, 6 miles distant, and with Lafayette, 2 miles distant. The entire length of the main-line and branches is 11½ miles: this work has been very profitable to the projectors. A third railroad, 1½ miles long, connects New Orleans with the Bayou St. John. Several other lines of railroad are in progress.

New Orleans is supplied with water by a public company, which has laid down 12 miles of pipes. The water is pumped from the river to a reservoir 30 feet high, where it is allowed to settle, and is thence distributed through the city. The city water-works is another establishment, used in the hot season only to pump water from the river and to convey it in open channels through the streets. A draining company has erected two steam-engines for draining the swamps between the city and Lake Pontchartrain, by which means an extent of about 35 square miles of land is reclaimed with great advantage to the adventurers, and benefit to the health of the inhabitants.

The shipping, registered and enrolled, that belonged to the port of New Orleans, in 1836, were of the burthen of 81,710 tons. The vessels that entered and cleared in that year were as follows:—

	Entered.		Cleared.	
	Ships.	Tons.	Ships.	Tons.
American .	503	95,833	632	147,838
Foreign .	210	50,294	190	48,110
Total .	713	146,127	822	195,948

The import and export trade of the state of Louisiana, nearly the whole of which centres at New Orleans, was as follows, in the year ending 30th September, 1838:—

	Imports. Dollars.		Exports. Dollars.
In American vessels .	7,342,614	Domestic produce .	30,077,534
Foreign do. .	2,154,194	Foreign do. .	1,424,714
Total	9,496,808	Total	31,502,248

The greater part of the domestic produce exported consisted of cotton.

New Orleans is distinguished for the courageous and successful defence which it made against the English in January, 1815. The English were commanded by Sir Edward Pakenham; the American defence was conducted by General Jackson. A breastwork was raised in front of the city, and strengthened by bales of cotton, which were brought in great quantities. Behind these cotton-bags General Jackson placed picked riflemen, each of whom had one, two, or three men behind him to load his rifles. The English were first exposed to a terrible fire of artillery within half cannon shot, and afterwards to the rifles and small-arms of the Americans. The British are understood to have [illegible]d between 10,000 and 12,000 men in this engagement, the Americans between 3000 and 4000. The British etween 3000 and 4000 men; the Americans had only seven wounded. Sir Edward Pakenham was killed.

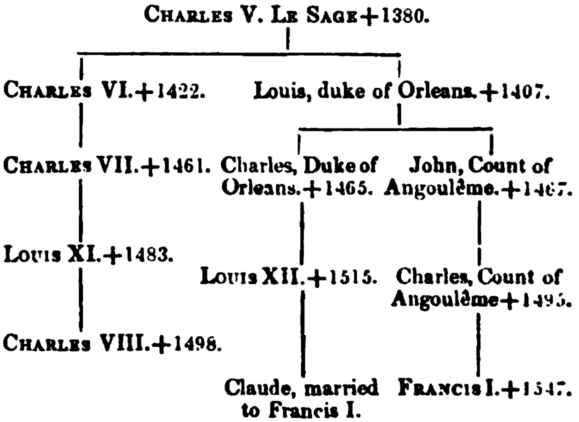
ORLE'ANS, HOUSE OF, the title of a branch of the royal family of France, which has three times originated in the younger son of a king, and has twice obtained possession of the crown.

I. The first House of Orleans sprang from Louis, second surviving son of Charles V., the earliest prince who appears to have borne the title of Duke of Orleans, and who, after playing a conspicuous and not very creditable part in the troubles which agitated the reign of his imbecile brother Charles VI., was assassinated at Paris, in 1407, by his cousin and rival John, surnamed *Sans Peur*, duke of Bourgogne. The results of this crime were most disastrous to France, which was filled with violence and bloodshed by the conflict of the two factions of the Bourguignons and Armagnacs: the Orleans party being distinguished by the latter title, from their leader, the count of Armagnac, who, as father-in-law of the young duke of Orleans, undertook to protect his cause, and avenge the murder of his father. The history of the first duke of Orleans is also memorable for his marriage with Valentina Visconti, daughter of Gian Galeazzo Visconti, duke of Milan, which eventually gave the house of Orleans pretensions to that duchy, and produced the Italian wars of Louis XII. and his successors for its possession.

The life of Charles, second duke of Orleans, was remarkable chiefly for his having been taken prisoner by the English at the battle of Azincourt, in consequence of which he suffered a long captivity, together with his younger brother John, count of Angoulême. Dunois, the famous 'Bastard of Orleans,' and progenitor of the house of Longueville, was his illegitimate brother.

Louis, son of Charles, and third duke of Orleans, was exposed, during the reign of Louis XI., to the splenetic jealousy of that gloomy tyrant, whose deformed daughter Jane he was compelled to marry: but on the death of Charles VIII., and the failure of the direct line of Valois, in 1498, the duke of Orleans succeeded to the crown by the title of Louis XII. On his own death, without male issue, in 1515 [Louis XII.], his cousin Francis, count of Angoulême, to whom he had given his daughter Claude in marriage, ascended the throne, under the title of Francis I.: and the royal succession thus devolved upon the second branch of the House of Valois-Orleans—or line of Valois-Angoulême, as it has been called—which contributed five sovereigns to France, viz. Francis I., Henry II., Francis II., Charles IX., and Henry III.

The following table will show the descent of the first house of Orleans.


CHARLES V. LE SAGE + 1380.
CHARLES VI. + 1422.
Louis, duke of Orleans. + 1407.
CHARLES VII. + 1461.
Charles, Duke of Orleans. + 1465.
John, Count of Angoulême. + 1467.
LOUIS XI. + 1483.
LOUIS XII. + 1515.
Charles, Count of Angoulême + 1495.
CHARLES VIII. + 1498.
Claude, married to Francis I.
FRANCIS I. + 1547.

II. The only prince of the second House of Orleans was Jean Baptiste Gaston, the younger of the two sons of Henry IV. and Maria de' Medici, who was born in 1608, created duke of Orleans in 1626, and died in 1660. Of a vain and unquiet, weak and heartless character, his life was a series of troubles and disgraces, which were caused principally by his own misconduct. During the reign of his brother Louis XIII., he was continually engaging in intrigues and conspiracies against Cardinal Richelieu: and, on their failure, purchased safety by his own humiliation and the base sacrifice of his unhappy accomplices. In 1626 he countenanced a plot against the life of the cardinal; and, on its detection, abandoned the Count de Chalais, one of the principal officers of his household, to the vengeance of the minister, who had his head struck off. Five years later, Gaston retired from court on some new quarrel with Richelieu, incurred the displeasure of his brother by contracting a marriage with Marguerite, sister of the duke of Lorraine, and finally withdrew into exile at Brussels, leaving his adherents again exposed to the persecution of the cardinal. At length, he re-entered the kingdom in open arms against the royal authority, but persevered in hostilities only until he was defeated at the combat of Castelnaudary, in which his principal partisan, the duke of Montmorenci, was made prisoner; when he obtained pardon for himself, without security for his captive friend, who was brought by the relentless Richelieu to the block. Gaston retired on this catastrophe again in terror to Brussels; but with his usual levity he was, after some time, induced to abandon his Spanish protectors and return to the court. Being entrusted with the command of an army against the Spaniards, he formed, in 1636, in conjunction with the Count de Soissons, another plot to assassinate the cardinal, caused the failure of the design by his irresolution, and on its exposure fled to Blois, but was soon after again reconciled with the court. The birth of a son to Louis XIII., by giving an heir to the monarchy, diminished the importance of the Duke of Orleans in the state; and he fell into comparative obscurity for some years, until, in 1642, it was discovered that he had entered into a treasonable treaty with Spain, for the subversion of the monarchy and the murder of the cardinal. The mean-spirited duke saved his own life, according to his custom, by the most abject submission, and by betraying his accomplices, among whom the young Marquis de Cinq Mars, a favourite of Louis XIII. himself, and François Auguste De Thou, son of the famous historian, were the principal victims. Gaston himself, on this occasion, did not escape without the loss of the honours due to his birth. He was deprived of his guards and his principal domains, and banished from the court. But the death of Richelieu and of Louis XIII. shortly changed the aspect of affairs; and in the minority of his nephew, Louis XIV., the Duke of Orleans was called to the post of lieutenant-general of the kingdom, under the regency of the queen mother, Anne of Austria. He gained some credit in the campaign of 1644 against the Spaniards, and for a time supported the government of the regent and her minister Cardinal Mazarin. But the absurd commotions of the *Fronde* soon tempted the characteristic levity of Gaston; and he allied himself, against the court and Mazarin, successively with the Prince of Condé and with the parliament of Paris. The latter body were moved by his cabals, though Louis XIV. had now attained his majority, to appoint him anew lieutenant-general of the kingdom, as the same title had been factiously conferred on the Duke de Mayenne in the time of the League. But the final triumph of Mazarin and the close of the civil wars produced for Gaston the usual fruits of his vacillation and perfidy; and in 1652 he was banished from the court to Blois, where he passed the remaining eight years of his life in mortification and contempt.

Gaston had no male issue; but he was the father, by his first marriage, with the heiress of Montpensier, of the princess who inherited that title, and who figured so conspicuously in those strange political scenes of her times, of which she has left her own memoirs. Louise de Montpensier, known among her contemporaries as 'La Grande Mademoiselle,' merited that designation as much by her aspiring character as her illustrious birth. She shone conspicuously in that galaxy of high-born French women who, more distinguished for their masculine spirit and wit than for the becoming virtues of their sex, ruled the ascendant throughout the political storms of the Fronde. While heroes and statesmen bartered their honour and policy for the smiles of beauty, while fortresses were surrendered to fair ladies' eyes, and treaties were made and broken with lovers' vows, these female warriors and politicians openly appeared in the camp and the council. Gaston of Orleans, in a style as much curious as burlesque, addressed a letter to 'Mesdames les comtesses, maréchales-de-camp in the army of my daughter against Mazarin.' With more boldness than her father, the Grande Mademoiselle showed her prowess by turning the guns of the Bastile against the royal troops to cover the retreat of the forces of Condé. 'That discharge has killed her husband,' said Mazarin, in allusion to her well-known ambition to espouse her cousin, the young king Louis XIV., whose regard was for ever alienated from her by this exploit. After having aspired to be queen of France and having refused the hand of several other sovereigns, Mademoiselle de Montpensier finished, at the mature age of forty-four years, by desiring to raise a private nobleman, the Count de Lauzun, to the rank of her husband and the title of duke of Montpensier. Louis XIV. first granted and then unkindly retracted his consent to the union; notwithstanding which it was privately concluded in 1670, an offence for which Lauzun suffered a ten years' imprisonment. After she had obtained his release by the sacrifice of her finest domains to a natural son of the king, the princess found her marriage neither recognised at court nor happy in itself; and she closed, in 1693, a life of strong passions, embittered by the disappointment both of political ambition and personal affection.

III. The progenitor of the third and existing House of Orleans was Philip, second son of Louis XIII. and Anne of Austria, who was born in 1640; received the title of duke of Orleans, on the death of his uncle Gaston, in 1660; and succeeded to the duchy of Montpensier, by the bequest of La Grande Mademoiselle, in 1693. His career was by no means distinguished; but he is said to have had some taste for letters; and he served with honour in several of the most glorious campaigns of the reign of Louis XIV. He was twice married; first, to his cousin Henrietta of England, daughter of Charles I., and, like himself, a grandchild of Henry IV.; and secondly, to Elizabeth of Bavaria, daughter of the Elector Palatine. The circumstances which attended the sudden death of his first wife, a princess celebrated for personal graces, in the flower of her age, cast upon him the horrid suspicion of having poisoned her; a charge however apparently as unfounded in itself, as the imputed crime was at variance with the whole tenor of his character, which, though he was too much addicted to the pleasures of sense, was mild and good natured. By the Princess Henrietta, Philip had two daughters, one of whom became the queen of Charles II. of Spain, and the other, through her marriage with Victor Amadeus II. of Savoy, transmitted to the House of Sardinia, after the extinction of the male line of Stuart, as much vain pretension to the inheritance of their crown as could be conveyed by mere descent in opposition to constitutional law. By his second marriage Philip had, besides a prince who died young, and a daughter, the son, of his own name, who, on his death in 1701, succeeded him in his titles.

This was the celebrated Regent Orleans, of whom Voltaire has declared, that 'famed for his courage, his wit, and his pleasures, he was born for society even more than for public affairs, and was one of the most amiable men that ever existed.' The severer judgment of history has branded the memory of Philip II., duke of Orleans, with the reproach of unbounded personal and political profligacy; and the fatal example both of his private life and public administration encouraged that corruption of morals in France, which, becoming aggravated throughout the licentious reign of Louis XV., unquestionably produced the worst excesses of the Revolution. Nature had endowed Philip II. of Orleans with great abilities; but his mind was early tainted by the lessons of his tutor, the able and infamous Dubois, who was afterwards, under his regency, a cardinal, his favourite, and prime-minister. Philip was a proficient in many sciences and accomplishments; in the mathematics, in poetry, music, sculpture, and painting. He had likewise in his youth displayed considerable talents for war, and some ambition to attain equal distinction in arts and arms. He was wounded on several occasions, signalised himself at the battles of Steinkerque and Neerwinden, commanded the French armies with courage and activity in Italy and Spain during the Succession War, and in the latter country established so much reputation and influence, that Louis XIV. is said to have suspected him of a design to supplant Philip V. on the throne of that kingdom. This and other causes of jealousy led Louis XIV., in anticipation of his great-grandson's minority, to meditate the exclusion of Philip of Orleans from the regency. But the death of the aged monarch prevented the completion of this plan; the duke quietly possessed himself of the government, and grievous as were the vices of his administration, he was guilty of no ambitious attempt to abuse the rights of the young king. His frame was worn out by debauchery before he had quite completed his fiftieth year; and a sudden death terminated his career in 1723. He had been married during the life of Louis XIV. to Françoise Marie de Bourbon, styled Mademoiselle de Blois, natural daughter of that monarch and Madame de Montespan.

by whom he had one son, born in 1703, and several daughters.

Louis duke of Orleans seemed at first disposed to emulate the vices of his father, whose better tastes for letters and science he also inherited. But his marriage with a princess of Baden, to whom he became tenderly attached, weaned him from early habits of dissipation; and her premature death, in 1726, affected his mind so deeply, that he withdrew from the world to a monastery. In this retreat he divided the remainder of his life between works of charity, religious exercises, and literary studies; and here, in 1742, he closed an existence dignified with every virtue that could adorn a recluse. Louis left a son and daughter, of whom the former, Louis Philippe, born in 1725, was his successor in the family honours. His life was remarkable only for his military service, in the early part of which he fought with gallantry at the battles of Dettingen and Fontenoy, and subsequently in some of the affairs of the Seven Years' War. He married a princess of the House of Conti, by whom he had a son and a daughter, and died in 1785.

Louis Philippe Joseph, the only son of the last duke, who was born in 1747, and known during his father's life as Duke de Chartres, became afterwards more unhappily distinguished as the Duke of Orleans of the National Assembly, the Louis Egalité of the Convention, the instrument and the victim of the French Revolution. Naturally gifted with a handsome person and superior talents, he had disfigured both mind and body by a youth of debauchery; and in maturer years his infamous reputation exposed him at the court of Louis XVI. to a contempt which he but too well repaid with deadly hatred to the person and family of that monarch. In the year 1778 he was present in the naval action between the squadron of Admiral Keppel and Count d'Orvilliers off Cape Ushant; and he was accused of having behaved in that engagement with such shameful cowardice, that, instead of receiving the advancement to which he aspired in the sea service, he was appointed colonel-general of hussars, a post created for him by the court with the intention, as it was said, of covering him with ridicule. Having, in 1785, succeeded to his father's title, he eagerly entered upon a political career, of which it seems to have been the object, by acquiring popularity, to revenge his injuries upon the court and to raise himself into power. He proved himself however utterly destitute of the qualities of a revolutionary leader, and was soon overwhelmed in the political tempest which he endeavoured to direct. At the commencement of the Revolution he arrayed himself on every occasion against the royal authority: during the progress of events which raised the Jacobin party into power, he became their associate and dupe; to render homage to their opinions as a member of the National Convention, he solicited and obtained permission to renounce the name of his family and assume that of Egalité; and finally, after having voted for the death of Louis XVI., he was himself dragged to the scaffold towards the close of the year 1793. He was married to Louise Marie de Bourbon-Penthièvre, daughter of the duke de Penthièvre, grand-admiral of France, by whom he left one son, the present King of the French, and a daughter, styled Mademoiselle d'Orleans.

(*L'Art de vérifier les Dates*; Sismondi, *Histoire des Français*; *Mémoires de Mademoiselle de Montpensier*; Voltaire, *Siècles de Louis XIV. et XV.*; Thiers, *Histoire de la Revolution Française*, &c.)

ORLOFF, G. [PETER III. OF RUSSIA.]

ORMOND, the name of a large territory in the Irish county of Tipperary; and from thence the title of a noble house, so antient and illustrious, that its origin has been, perhaps fancifully, ascribed to the ducal blood of Normandy, before the conquest of England. But it is certain that this family, having become established in Ireland, and distinguished by many services to the crown, as well as by several noble intermarriages, was recognised in that country, from the very beginning of the thirteenth century, as holding the hereditary office of royal cup-bearer or butler: from which, whether then or at an earlier period, their sirname appears to have been derived. Edmund le Botiller was raised by Edward II. to the earldom of Carrick; his son James, who espoused Eleanor Bohun, granddaughter Edward I., was created by Edward III. earl of Ormond; the issue of that marriage, a second James, called, from royal descent, 'the noble earl,' filled the dignity of Justice of Ireland, the government of which kingdom was administered under various titles by several of his descendants.

The distinguished individual however of the race was **JAMES BUTLER, DUKE OF ORMOND**, justly described by his biographer as 'one of the ablest statesmen, most accomplished courtiers, and worthiest persons of the age in which he flourished.' He was born in London in 1610; and, notwithstanding the splendour of family dignities which he was destined to augment, his youth was passed under circumstances sufficiently adverse to have obscured the career of a less energetic spirit. His grandfather, Walter, earl of Ormond, who had succeeded to the title only collaterally, was exposed to the tyranny of James I., and imprisoned for several years, because he refused to submit to an unjust award of that monarch in behalf of one of his Scottish favourites, Sir John Preston, created lord Dingwall, to whom the king had compelled the late earl to marry his daughter, and was now resolved to convey the family estates. The eldest son of Earl Walter married, against his consent, a daughter of Sir John Poyntz; and being drowned in crossing the Irish Channel, during his father's life, left without provision a large family, of which James Butler, the future duke, was the eldest son. When Earl Walter was thrown into prison, his grandson and heir, young James, now styled viscount Thurles, was arbitrarily seized in wardship by the crown, but, with some care for his instruction, committed to the tutelage of archbishop Abbot; the only benefit by which the king may have designed to mitigate his cruel oppression of the family. The archbishop is said to have neglected the general education of his charge; but he caused him to be well instructed in the Protestant faith, to which we have the testimony of Burnet, in other respects not his panegyrist, that he staunchly adhered throughout his life.

On the death of James I., Earl Walter having recovered his own liberty and the guardianship of his heir, then in his sixteenth year, the young Lord Thurles began soon after to figure at court, where he paid his addresses to his kinswoman, Lady Elizabeth Preston, and having engaged her affections, succeeded, not without many difficulties, in obtaining the royal assent to their union. This marriage, which took place in 1629, and seems to have been produced as much by mutual attachment as policy, was however not the less fortunate in reconciling differences which had been fatal to both their families; and, in 1632, Lord Thurles succeeded, on his grandfather's death, to the earldom of Ormond.

It was at this time that Lord Wentworth, more unhappily distinguished under his later title of Strafford, entered on the government of Ireland; and the spirited and honourable deportment of the young earl of Ormond soon attracted so much of his notice as to lead him to prophesy, with characteristic penetration, that 'that young nobleman would make the greatest man of his family.' In subsequent years, the upright and generous devotion of Ormond to the service of the crown and country won the respect even of the overbearing Strafford; and after his own ruin, one of his last requests to his royal master was, that his blue ribbon of the Garter might be bestowed upon his friend Lord Ormond. On the breaking out of the Irish Rebellion of 1640, Ormond was appointed by the lords-justices to the command of the royal troops; and throughout the disastrous period which followed, he continued, amidst the fury and jealousy of factions, embittered both by political and religious hatred, to pursue with unshaken integrity and moderation a course of true patriotism and fidelity to his duty. With very inadequate forces, he repeatedly defeated the rebels, near Dublin, at Drogheda, at Kilrush, and at Ross; but notwithstanding these services, in the course of which he was thanked by the Long Parliament, and raised to the dignity of marquis by the king, he was so ill supported on all sides, that he was unable longer to sustain the unequal conflict in which he had engaged. There were now no fewer than five parties in Ireland:—the Protestants and Roman Catholics well affected to the king, but opposed to each other; the Protestants favourable to the parliamentary cause; the Papists under their priests wholly devoted to the court of Rome; and the Scotch Presbyterians of the north, who had their separate interests and feelings. The exertions of Ormond being paralysed by the dissensions which prevented the majority of these factions from uniting against the common enemy, he was compelled, in 1643, to conclude a treaty for a cessation of arms, which, on account as the previous barbarities committed by the Irish rebels, excited great dissatisfaction in England.

Throughout the next four years, during which the civil war was raging in England, Ormond, who had been invested by Charles I. with the nominal dignity of lord-lieutenant of Ireland, contrived in some measure to hold that kingdom for his master, and even to detach forces to his aid. But when Charles had fallen into the hands of his enemies, the position of the lord-lieutenant in Ireland against the Roman Catholics having become completely untenable, he resigned his authority by treaty into the hands of parliamentary commissioners, and proceeded to render a satisfactory account of his conduct to the king, then a prisoner at Hampton Court. From thence he retired to France; but still directing his attention to Ireland, and receiving encouragement from the portion of the Roman Catholics best affected to the crown, he again landed in that kingdom, and endeavoured to restore the royal authority. Notwithstanding every gallant effort however, he was defeated in an attempt to besiege the parliamentary forces under Colonel Jones in Dublin; and Cromwell himself soon after landing in Ireland with an overwhelming force, Ormond was finally obliged, at the end of the year 1650, to evacuate the island and withdraw to France. From this time until the death of Cromwell, during which interval he was frequently reduced to great straits for the common necessaries of life, Ormond was actively and variously employed in many important and dangerous missions for his exiled king, Charles II.; and, on the Restoration, he accompanied Charles to England, and was rewarded for his sufferings and services by his elevation to the ducal title and other honours.

The remainder of the life of the duke of Ormond was passed, though not without some troubles and reverses, in the dignified enjoyment of a high rank and spotless reputation. These could not always protect him from the royal caprice and the base machinations of court intriguers; and during the reigns of Charles II. and James II., he was twice again possessed and deprived of the government of Ireland, which he administered for many years with admirable integrity, wisdom, and justice. It was in the interval of his long tenure of this high office, that, in 1670, a singular and atrocious outrage was committed upon his person in the streets of London by that notorious ruffian Colonel Blood, who, with five accomplices, waylaid him as he was returning from a state dinner in the city, and dragged him from his coach, with the intention, as it was believed, if he had not been rescued, of hanging him at Tyburn. Blood, who had been engaged in a plot to seize the castle of Dublin during Ormond's government of Ireland, pretended that he was resolved to retaliate upon the duke's person for the execution of some of his associates on that occasion; but it was strongly suspected that the villain had been instigated to his audacious attempt by the profligate duke of Buckingham, the bitter enemy of Ormond; and so convinced was his gallant son, the earl of Ossory, of the guilt of Buckingham, that, soon after, at court, seeing that nobleman standing by the king, he said to him, 'My lord of Buckingham, I know well that you are at the bottom of this late attempt of Blood's upon my father; and therefore I give you fair warning, that if my father comes to a violent end by sword or pistol, if he dies by the hand of a ruffian, or by the more secret way of poison, I shall not be at a loss to know the first author of it. I shall consider you as the assassin; I shall treat you as such; and wherever I meet you, I shall pistol you, though you should stand behind the king's chair. And I tell it you now in his Majesty's presence, that you may be sure I shall keep my word.'

Ormond himself was remarkable for some pithy sayings. When he was ungratefully abandoned to the malice of his enemies by Charles II. in his first government of Ireland after the Restoration, he contented himself with saying to the king, that 'though it would never trouble him to be undone for his Majesty, yet it would be an insupportable affliction to be undone by him.' And when Blood had been made prisoner in his attempt to seize the regalia, and Charles, strangely infatuated, if not disgracefully intimidated by the language of the ruffian, whom curiosity led him to visit in the Tower, sent to Ormond to desire that he would forgive Blood, for reasons which Lord Arlington would tell him, the duke drily replied to that nobleman, 'that if the king could forgive the offender for stealing the crown, he might easily forgive the attempt upon his life; and that if such was his Majesty's pleasure, that was for him a sufficient reason, and his lordship might spare the rest.' Ormond lived unmolested for many years after this flagitious attempt, though he had the misfortune to survive the noble-minded Ossory; and he himself died, full of years and honour, in the year 1688.

Of his numerous children, the eldest who grew to manhood was Thomas, earl of Ossory, the worthy son of such a father, and eulogized by Burnet as 'a man of great honour, generosity, and courage.' He was also gifted with many intellectual accomplishments; was equally distinguished throughout the reign of Charles II. for his military services by sea and land; and would probably, if his life had been spared, have proved himself even a more perfect character than his parent: but he died of a violent fever in 1680, at the premature age of forty-six years. He was the father of James, second duke of Ormond, who inherited several of the generous and chivalric qualities of his house, and took a conspicuous share both in the military achievements and civil dissensions of the reigns of William III. and Queen Anne. But when driven from England on the accession of George I., by the persecution of his political antagonists, he embraced the cause of the Pretender; and being consequently attainted, he sullied his fame by engaging in the service of the natural enemies of his country, and accepting from the king of Spain the command of an abortive expedition for the invasion of Great Britain.

(Carte's *Life of the Duke of Ormond*; Burnet's *History of his own Time*; *Biographia Britannica*, art. 'Butler.')

ORMSKIRK. [LANCASHIRE.]

ORMUS, or more properly **HORMUZ**, is an island at the entrance of the Persian Gulf, near 27° N. lat. and 56° 30′ E. long. It is about ten miles from the Persian coast, and about twelve miles in circumference. Its form is nearly circular, and its appearance from the sea is broken and rugged. It is a mere barren rock, without vegetation. The surface, which is entirely without soil, exhibits the singular stratification of the island; the conical shape and isolated position of the numerous small hills of which the island consists, lead the spectator to attribute its origin to volcanic agency. The rugged hills which line the eastern shores of the island are covered for a considerable distance from their base with an incrustation of salt, which in some places is as transparent as ice. In other places the surface is covered with a thin layer of dusky red-coloured earth, which owes its colour to the oxide of iron, with which the whole surface of the island is impregnated. Even the sand on the sea-shore is composed of the finest particles of iron, pulverised by the waves. As the island contains no fresh-water springs, the inhabitants use the rain-water collected in several tanks, which were constructed perhaps some 300 years ago. There is excellent anchorage on the north-eastern shore, opposite the town, where a vessel may be sheltered from all winds within half a mile of the shore. The fortress is situated about 300 yards from the shore, on a projecting point of land, which is separated from the island by a moat. On the plain which stretches from it to the hills, and is about two miles wide, are the ruins of the once-famous town of Hormuz. The Imam of Muskat has now possession of the island; he farms it from the king of Persia, and has a garrison of 100 men in the fortress. He derives a revenue from the salt, which is exported in large quantities. In 1827, the number of inhabitants was estimated at 300, all of whom were employed in collecting salt or in fishing.

The name of Harmozia occurs in Arrian's 'Indica,' where however it does not denote the island, but a town situated opposite to it on the continent of Persia, on the river Anamis, now called Minaw. The name was afterwards transferred to the island, which, according to Ouseley, was previously called Jerûn. In antient times it seems only to have served as a place of retreat to the inhabitants of the adjacent shores in times of invasion or civil commotion. Albuquerque took possession of the island in 1507, and of the town, which was then on it, with the view of preventing the Arabs who inhabited the shores of the Gulf from sending aid to the petty sovereigns on the coast of Malabar, with whom they carried on a lucrative commerce. The consequences of this event were much more favourable to the Portuguese than Albuquerque had imagined. The inhabitants of the shores of the Persian Gulf finding that their commerce with Hindustan was entirely cut off, the Portuguese made Ormus the deposit of all kinds of Indian goods, and managed their affairs so well, that in a short time Ormuz became a populous and rich commercial town. The buildings covered a space three miles in length along the sea-shore, and two miles in width. The town contained 4000 houses and 40,000 inhabitants, and its commercial relations extended over all Persia and Mesopotamia to Bokhara and Samarkand in Turkistan. The loss of Ormuz was one of the first signs of the decline of the Portuguese power in India. In 1622, Shah Abbás the Great took it from them, in which enterprise he was assisted by the English with a squadron of nine sail of the line. He expelled the Portuguese, demolished the town, and transferred its commerce to Gombroon, or Bunder Abbas, on the mainland of Persia, nearly opposite to Ormus. Gombroon continued to be the principal commercial town on the Gulf of Persia until the middle of the last century, when Aboushehr took its place.

(Ouseley's *Travels in various Countries in the East, &c.*; Kinneir's *Geographical Memoir;* Kempthorne 'On the Eastern Shores of the Persian Gulf,' in *London Geographical Journal*, vol. v.; and Whitelock 'On the Islands and Coast at the Entrance of the Gulf of Persia,' in *London Geographical Journal*, vol. viii.)

ORNE, a department in the northern part of France, bounded on the north by the department of Calvados, on the north-east by that of Eure, on the east and south-east by that of Eure et Loir, on the south by those of Sarthe and Mayenne, and on the west by that of Manche. The department has an irregular oblong figure; the greatest dimension is from east to west, from the neighbourhood of Longny to that of Passais near Domfront, 84 miles; the greatest breadth from north to south is from near La Ferté Frenel to the contact of the three departments of Orne, Sarthe, and Eure et Loir, 50 miles. It is comprehended between 48° 10′ and 48° 57′ N. lat., and 0° 59′ E. and 0° 52′ W. long. The area of the department is estimated at 2364 square miles, being very little less than the average area of the French departments, and rather exceeding the conjoint areas of the English counties of Kent and Surrey. The population, in 1831, was 441,881; in 1836 it was 443,688, showing an increase in five years of 1807, or less than half per cent., and giving 183 or 184 inhabitants to a square mile. In amount of population it is inferior to either of the above-mentioned English counties, and in density of population very far below them. Alençon, the capital, is 105 miles in a direct line west-south-west of Paris, or 115 miles by the road through Versailles, Dreux, and Mortagne.

The department is traversed in the direction of its length by the mountains which form the prolongation of the Armorican chain, and which separate the basin of the Loire from the basins of the Seine and the various small rivers that flow into the English Channel. The western side of the department is occupied by the primitive and other rocks which underlie the coal-measures. Coal is not found, at least not worked. The valleys of the Sarthe and Orne are chiefly occupied by the formations which intervene between the chalk and the new red-sandstone; and the eastern side of the department is overspread by the chalk which encircles the Paris basin. Mines of iron and manganese are worked in several places: gold was once found, but the working of the mine has been long given up. Granite of a fine grain, limestone, freestone, white and grey marl, kaolin for porcelain and clay for earthenware, sand of various kinds suited for glass-works, and the crystals of quartz known as the Alençon diamonds, are dug. There are several medicinal springs, the most important of which are those of Bagnoles near Juvigny, in the arrondissement of Domfront. There are twelve iron-works in the department, in which are ten furnaces for smelting pig-iron, and thirty forges for producing wrought-iron. Charcoal is almost exclusively employed as fuel in these works.

There are no navigable rivers in the department. The Mayenne has its source and some part of its course just within the southern border; and the Vée, the Varenne (with its feeder the Egrame), and the Sarthe, tributaries of the Mayenne, also rise in the department, in or upon the border of which the Sarthe has the first 35 miles of its course. The Huine, a tributary of the Sarthe, and the Commeauche and the Meme, feeders of the Huine, rise in this department, and water its eastern part. The Mayenne and its tributaries belong to the system of the Loire. The Eure, he Iton, the Rille, the Charentonne, and the Gruil, all which belong to the system of the Seine, rise on the eastern side of the department. The Orne rises near Séez, and flows nearly 40 miles before it quits the department: its tributaries, the Thouane, the Ure, the Cance, the Udon, the Rouvre, and the Noireau, and the Vere, a feeder of the Noireau, belong to this department. The Dives and the Toucques, with its feeder the Vie, rise in the department. The Orne, the Dives, and the Toucques flow into the English Channel. There are no navigable canals, and the department is entirely destitute of internal navigation.

There are eight Routes Royales, or government roads, having an aggregate length of 204 miles, viz. 85 in good repair, 113 out of repair, and 6 unfinished. The principal road is that from Paris to Rennes and Brest, which enters the department on the east side, and passes through Tourouvre, Mortagne, Le Mêle, and Alençon, about 12 miles beyond which it quits the department. Roads lead from Alençon in one direction to Le Mans, in the department of Sarthe; in another, by Séez and Gacé to Rouen, in the department of Seine Inférieure, with a branch from it at Séez by Argentan to Falaise and Caen, in the department of Calvados. A road from Caen to Mayenne and Laval (Mayenne) passes through Flers and Domfront, in the western side of the department; and a road from Paris to Alençon by Chartres and Nogent-le-Rotrou (Eure et Loir) passes through Bellême in the south-eastern corner. The Routes Départementales, or departmental roads, have an aggregate length of 294 miles, viz. 183 in repair, 6 out of repair, and 105 unfinished. The bye-roads and paths have an aggregate length of above 4500 miles.

The climate is temperate: westerly winds are predominant, and bring with them mists and rain. Agriculture is in a backward condition, the cultivators clinging to old usages with considerable tenacity. The whole surface of the department is estimated at more than 1,500,000 acres, of which about 800,000 acres, or above half, are under the plough. The principal grain cultivated is oats, the produce of which exceeds the average produce of France in the proportion of 4 to 1. In wheat and barley the produce is below the average of France, in rye and maslin, or mixed corn, considerably below, and in potatoes still more so; but in buckwheat the preponderance is proportionately almost as great as in oats. About 25,000 acres are occupied as orchards and gardens: the growth of apples for cider is very great, though perhaps not equal to what it was before the Revolution. As no wine is grown, cider is the common drink, and in abundant years a portion of it is distilled into brandy. Pulse, hemp, and flax are raised; plums are grown in considerable quantity; and some beet-root for the manufacture of sugar. There are about 300,000 acres of meadow land, and heaths and open pasture-grounds to the extent of 45,000 acres. The meadows, especially in the valleys of the Toucques and the Vie, produce abundance of grass, and furnish food for the horses and horned cattle, in the number of which this department is pre-eminent. The horses are of the best Norman breed, and the horned cattle are generally of good breed. The butter and cheese, except the cheese of Vimoutiers, which is in good repute, are of inferior quality. The oxen for fattening are brought from the departments of La Vendée, Deux Sèvres, and Mayenne: the finest beasts are sent to Poissy (Seine et Oise) for the supply of Paris. The number of sheep rather exceeds the average of France, but the breed and management have been very much neglected: folding them is little practised. The introduction of the Merinos and the crossing of the breed with them have led to some improvements. Swine are numerous, and are almost entirely destined for the supply of Paris. In the arrondissement of Argentan, poultry, especially geese, are much attended to, and their flesh and their quills and feathers form important articles of produce. Bees are kept. There are about 180,000 acres of woodland. Small game are tolerably abundant; the partridges of Domfront are in high repute. The rivers abound with fish.

The department is divided into four arrondissements as follows:—

		Sq. Miles.	Population. 1831.	1836.	Communes.
Alençon	S.	400	73,198	72,443	95
Argentan	N.	723	113,955	113,233	190
Domfront	W.	482	128,948	131,745	94
Mortagne	E.	759	125,780	126,267	155
		2364	441,881	443,688	534

There are thirty-six cantons or districts, each under a justice of the peace.

The arrondissement of Alençon contains the towns of Alençon (population, in 1831, 13,548 for the town itself, or 14,019 for the whole commune; in 1836, 13,934 for the commune) [ALENÇON] and Le Mêle, on the Sarthe; Séez (population 3672 for the town, 5059 for the whole commune), on the Orne; Carrouges, on the Udon, a feeder of the Orne; and Essey, between Le Mêle and Séez. Séez, probably the capital of the Saii, an antient Celtic people, was of more importance in the ninth century (when it was destroyed by the Normans) than it is at present. In the subsequent centuries it suffered severely in the wars of France with the dukes of Normandie and the English. Its principal edifice is the cathedral, a Gothic building of the twelfth century, adorned with sculptures and paintings. The townsmen are engaged in the manufacture of embroidered muslin and other cotton goods. There are a college and an agricultural society. Charlotte Corday was born at Séez. Le Mêle is a tolerably handsome town of one street along the road from Paris to Alençon and Rennes. The inhabitants amount to about 1800. At Carrouges the manufacture of an embroidered muslin is carried on.

In the arrondissement of Argentan are—Argentan (population, in 1831, 5812 for the town, or 6147 for the whole commune; in 1836, 5772 for the commune) [ARGENTAN] and Ecouché, on the Orne; Grand Mesnil, on the Thouane, a feeder of the Orne; Briouze, near the Rouvre, another feeder of the Orne; Rânes, between the Thouane and the Rouvre; Exmes, Chambois, and Trun, on the Dives; Vimoutiers, on the Vie; Merlerault, Gacé, and Le Sap, on or near the Touques; and Echauffou, St. Evroult, and La Ferté Fresnel, on or near the Charentonne. Vimoutiers is the centre of a district in which 20,000 persons are engaged in the manufacture of stout bleached linens. There are several tanyards in the town, which has a population of about 3500. The village of Sainte Honorine de Guillaume, west of Argentan, has a population of 2000, who are engaged in quarrying and working granite; and at Le Pin, near Argentan, is an extensive establishment for improving the breed of horses. Before the Revolution, this establishment was maintained in great extent and completeness, and persons resorted to it from all parts of France, and from England, Spain, Germany, and Italy, to purchase saddle-horses or hunters. It was suppressed in the early period of the Revolution, but its suppression led to a great degeneracy in the horses of Normandie, and it was re-established during the consular government.

In the arrondissement of Domfront are—Domfront (population, in 1831, 1511 for the town, or 1873 for the whole commune; in 1836, 2417 for the commune) and St. Gervais, on the Varenne; Lonlay, on the Egrenne; Flers (population 1640 town, 4262 whole commune), on a branch of the Vere; Tinchebray (population 3254 town, 3413 whole commune), on the Noireau; La Carneille, near the Rouvre; Couterne and Juvigny-sous-Andaine, on or near the Mayenne; and La Ferté Macé (population 2192 town, 4413 whole commune), on a branch of the same river. Domfront is situated on the summit of a steep rock, through a cleft in which, 300 feet deep, the river Varenne flows. The townsmen manufacture coarse linens and other woven goods. At Flers and La Ferté Macé cotton goods are woven, and at the latter box-wood snuff-boxes are made. There are iron-works and paper-mills at Tinchebray, which has some historical interest as the scene of the battle which transferred the duchy of Normandie from Robert, eldest son of William the Conqueror, to his younger brother and competitor Henry I. of England.

In the arrondissement of Mortagne are—Mortagne (population, in 1831, 4742 town, 5150 whole commune; in 1836, 5171 commune), near the head of the Commeauche; Tourouvre, near the bank of the same river, and Longny on one of its feeders; Mauves and Rémalard or Regmalard, on the Huisne; Bellême (population 3384 town, 3413 whole commune), on the Même, a feeder of the Huisne; Moulins-la-Marche, near the head of the Sarthe; and L'Aigle (population 4712 town, 5410 whole commune), on the Rille. Mortagne is on the summit and the eastern slope of a hill, the height of which has been estimated (but probably with exaggeration) at 1000 feet. It is walled, and entered by five gates, adjacent to which are as many suburbs. The principal street is of considerable length and of a good width; it runs along the road from Paris to Brest, and near its western end is the parade, the principal open space in the town. Mortagne is the residence of many genteel families, and abounds with mansions and good houses, which, together with the length and width of its principal street, lead travellers to think it of greater extent and importance than it really is. The numerous shops are well furnished, and with articles of luxury or convenience not commonly kept in towns of the same size; with these articles it supplies places larger than itself. The great want of the town is of water. It is supplied from fountains at the foot of the hill, from whence the water is carried and sold to the inhabitants. The principal church is in a commanding situation; it is of Gothic architecture, and its massive tower, surmounted with 'a quadrangular dome,' forms a striking object at a distance. There is an hospital or almshouse, with a pleasant garden attached; but has not (unless lately established) either a theatre or public walk. There are some linen and cotton manufactures; the linens are suited for exportation to the colonies. There are two weekly markets, and several yearly fairs, two of them considerable horse-fairs. Mortagne was anciently the capital of the province of Le Perche, and a place of strength; it suffered much in several wars, and in the war of the League was pillaged by one party or the other twenty-two times in less than four years. A few miles from Mortagne is a Trappist convent, re-established with additional austerities since the restoration of the Bourbons. At Tourouvre, which has about 1500 to 2000 inhabitants, are iron and glass works; at Longny, which has about 2500 to 3000 inhabitants, there are iron-works, and trade is carried on in cattle and horses. Rémalard or Regmalard, with about 1700 inhabitants, is pleasantly situated, and is the seat of a small trade in hemp and hides. Bellême is on a hill; it consists of one principal street along the road from Chartres and Nogent to Alençon. It was formerly a place of strength, and sustained several sieges. The inhabitants manufacture some table and other linens, cotton goods, and paper; and trade in agricultural produce, and in wood obtained from the forest of Bellême, one of the best in France for the fine trees which it produces, though not of great extent. At Moulins-la-Marche fire-arms are manufactured. L'Aigle is pleasantly situated on the slope of two hills, and is surrounded by walls and a ditch. It is probably the busiest manufacturing town in the department. The pins and knitting and sewing needles made here are known all over France; and a great quantity of curtain-rings, iron, steel, steel and copper wire, wires for pianos, and other small hardwares are made. Stockings, hats, laces, tapes, woollen and linen fabrics, leather, and paper are also manufactured. There are five yearly fairs.

The population of the towns, when accurately given, is from the census of 1831; and, when not otherwise specified, is that of the whole commune; when given approximately, it is from Dulaure's *Environs de Paris* (A.D. 1828), or Vaysse de Villiers's *Itinéraire Descriptif* (1821-1829).

The principal manufactures in the department are those of iron and hardwares in the arrondissements of Mortagne and Argentan; lace, linens, and cottons in those of Alençon and Domfront; haircloth, pottery, glass, paper, and leather. Many of the inhabitants resort every year to the neighbouring departments to follow their business as stone-cutters, hemp-combers, gardeners, hawkers of haircloth, &c. This custom of migration has diminished since the Revolution.

The department constitutes the diocese of Séez, the bishop of which is a suffragan of the archbishop of Rouen. It is in the jurisdiction of the Cour Royale and the Académie Universitaire of Caen; and in the fourteenth military division, of which Rouen is the head-quarters. It returns seven members to the Chamber of Deputies. In respect of education it is above the average of France; of the young men enrolled in the military census of 1828-29, 45 in every 100 could read and write.

At the time of the Roman conquest this part of France was included chiefly in the territory of the Saii (who were probably the Essui of Cæsar), but portions of it appear to have been included in the respective territories of the Baiocasses, the Viducasses, the Lexovii, the Aulerci-Eburovices, the Carnutes, the Aulerci-Cenomani, and the Diablintes. These were all Celtic nations, and were comprehended in the Roman province of Lugdunensis Secunda, except the last three, who were included, the Aulerci-Cenomani and the Diablintes in Lugdunensis Tertia, and the Carnutes in Lugdunensis Quarta. The only antient town known in have existed within its boundary was Saii, now Séez. Some Roman antiquities have been found; among them are some inscriptions near a mineral spring in the forest of Bellême. In the middle ages this district constituted Le Pays d'Houlme and La Campagne d'Alençon; it also formed part of Les Pays de la Campagne, d'Ouche, de Lieuvin, and de Boccage, all in Normandie. The arrondissement of Montagne formed part of the county of Perche. The country suffered much from the wars of the Normans and the English in France, and from the religious wars of the sixteenth century.

ORNITHICHNITES, Professor Hitchcock's name for the footmarks of birds impressed on the surface of sandstone in the valley of the Connecticut. [GRALLATORES, vol. xi., p. 345.] The following will be read with interest as being connected with this subject:—

In a paper read before the Geological Society of London on the 15th May, 1835, Dr. Mantell stated that soon after his attention was directed to the fossils of the Wealden, he discovered in the strata of Tilgate Forest several slender bones, which, from their close resemblance to the tarso-metatarsal bones of certain *Grallæ*, or *Waders*, he was induced to refer to Birds. The correctness of this opinion was afterwards doubted, in consequence of the so-called bones of birds found at Stonesfield being ascertained to be the osseous remains of Pterodactyles. Subsequently however Dr. Mantell discovered specimens of a more decided character, and submitted them to Baron Cuvier during his last visit to England; and that distinguished zoologist pronounced them to have belonged to a Wader, probably a species of *Ardea*. Doubts were, notwithstanding, still entertained, not only whether these remains did really belong to any of the *Ardeidæ*, but whether they were referrible to Birds at all. The specimens having been placed by Dr. Mantell in the hands of Professor Owen, that acute comparative anatomist pointed out one bone as having undoubtedly belonged to a Wader. This fossil he declared to be the distal extremity of a left tarso-metatarsal bone, and it presented the articular surface, or place of attachment, of the posterior or opposable toe. Other specimens of long bones were conceived by the professor to have belonged to a more erpetoid form of bird than is now known.

This examination confirms Dr. Mantell's previous views of the existence of the remains of birds below the chalk, and the fossils described by him are the oldest *remains* of the class at present discovered. (*Geol. Proc.*, vol. ii.; *Geol. Trans.*, vol. v., 2nd series.)

ORNITHOCE'PHALUS, Sömmering's name for the extinct Saurian form termed *Pteroductylus* by Cuvier. [PTERODACTYLE.]

ORNITHO'LOGY, the science which teaches the natural history and arrangement of birds. The term is derived from the Greek words Ὄρνις, 'ornis,' a bird, and λόγος, 'logos,' a discourse; signifying literally 'a discourse upon birds.' [BIRDS.]

ORNI'THOPUS, is a genus of small papilionaceous annual plants, found in pastures and wild places in Europe. They are characterised, among other things, by a cluster of curved pods which are jointed something like a bird's toe, on which account they are called bird's-foot trefoil. The species found in this country is a plant from two to six inches high, with pinnated leaves and small white flowers striped with red, and is of no economical importance; but in Portugal occurs the *O. sativus*, an annual growing as much as two or three feet high, with stems as succulent and nutritious as those of vetches or lucerne, and cultivated in that country as food for cattle under the name of *Serradilla*. It succeeds in blowing sand, and is capable of yielding an abundant produce in the poorest soils. The writer of this note formerly saw it grown to some extent in the sandy land about Thetford, and the crop of herbage at that time was most abundant; it does not however seem to have been introduced into general cultivation.

ORNITHORHYNCHUS, Blumenbach's name for that extraordinary quadrupedal form, *The Duckbill*, or *Duckbilled Platypus*, *Platypus anatinus* of Shaw; *Mallangong*, *Tambreet*, and (according to the French) *Mouflengong* of the natives of New South Wales; *Water-mole* of the English olonists.

It is hardly to be wondered at that when this animal was first sent from New Holland to this country, it was received by zoologists with caution amounting to suspicion. The ingular beak, which occupied the usual place of the mouth, startled the observer when it appeared as the organ of a hairy quadruped; nor was it till one or two more specimens arrived (from Governor Hunter, we believe, and addressed to Sir Joseph Banks) that naturalists were ready to allow that this beak was naturally attached to the body.

Upon a form so anormal conjecture was busy, more especially as to that part of its organization relating to reproduction. Was it oviparous or viviparous? Did it suckle its young? These were questions constantly asked, and answered as such questions generally will be, in the absence of autopsy and direct experiment, with considerable tact and learning by the supporters of the different theories, but with no satisfactory result. Evidence however gradually came in, and fortunately fell into the hands of those capable of using it; and we now know, principally by the enlightened labours of Professor Owen, that the *Ornithorhynchus* is an ovoviviparous animal, that it suckles its young, and that its proper place is among the *Monotremata*, or Monotremes, a group to which no animal hitherto discovered belongs, excepting that which forms the subject of this article and *Echidna*. [ECHIDNA; MONOTREMES.]

Both these forms appear to have been first presented to the public by Dr. Shaw:—*Echidna* under the appellation of *Myrmecophaga aculeata*; and the Duck-billed animal under the name of *Platypus anatinus*. This was at the close of the eighteenth century: at the commencement of the present, Blumenbach described the latter form more at large under the title of *Ornithorhynchus*; and Mr. Home (afterwards Sir Everard) gave an account of some anatomical peculiarities connected with the head and beak, in *Phil. Trans.* (1800). Sir Everard's subsequent papers on the anatomy of *Echidna* and *Ornithorhynchus* (*Phil. Trans.*, 1802) went more at large into the subject, and disclosed numerous affinities between two forms differing much in external appearance. He therefore grouped them both under the same generic name; and at the same time expressed his opinion that the generative process differed considerably from that of the true *Mammalia*, resting that opinion on the peculiarities of the organs destined for reproduction, and on the absence of nipples in both species, especially in the female *Ornithorhynchus*.

Geoffroy St. Hilaire was not tardy in adopting the opinion of Sir Everard. He constituted a new order for these strange forms, and a hasty dissection having led him to conclude that the genital products of *both sexes*, as well as the urine and fæces, had their issue by a common outlet, he gave to that order the name of *Monotremes*. His inferences were, that both mammary glands and nipples were wanting, and certain accounts of the discovery of eggs of the *Ornithorhynchus*,* strengthening his belief in the oviparous character of the *Monotremes*, he separated that order from the *Mammalia*.

A penetrating mind like Cuvier's could hardly fail of being particularly attracted by these anomalous forms. The *Myrmecophaga aculeata* of Shaw was soon removed by the great and acute French zoologist from the true *Ant-eaters* (among which its first describers, deceived by external appearances, had placed it), and separated under the name of *Echidna*, by which it is still known. Following out the anatomy of that form as well as of *Ornithorhynchus*, he saw their mutual relations, and adopted Geoffroy's group and name, but did not exclude the tribe or family from the *Mammalia*.

The opinions of Geoffroy were strenuously opposed by Oken and De Blainville. The former even conjectured that the mammary glands would be found in the *cloaca*. The latter, in a learned dissertation upon the place which *Echidna* and *Ornithorhynchus* ought to occupy in the system, expressed his confidence that the mammary glands would be ultimately detected, and his opinion that the animals themselves approached closely to the *Marsupialia*.

We now arrive at a period when the thick darkness which overshadowed this interesting subject began to be dispelled by the light derived from a further supply of subjects and consequent anatomical investigation. Professor Meckel (1824, 1826) determined the existence of the mammary glands, and showed, particularly in his work of the latter date (Monograph on *Ornithorhynchus paradoxus*), that they were largely developed in the female. Their situation, size, form, and lobular composition are accurately described. He was not able to inject the gland, and did not accurately know the exact termination of the ducts, but he noticed certain small eminences in the middle of the areola, and announced that they were without doubt the orifices of those ducts. So far Meckel satisfactorily proved the relationship of the *Ornithorhynchus* to the *Mammalia* in general, but his reasoning led him to conclusions not consonant to the identity of their mode of reproduction. He argued that the difference between the production of living young and of eggs is in reality very small and not essential, that birds have occasionally hatched the eggs within the body, and, in effect, given birth to a living chick; concluding that as the generation of the *Marsupialia* closely resembles the oviparous mode, it is highly probable that the method of generation of the *Ornithorhynchus*, which approaches still nearer to birds and reptiles, might be analogous in proportion.

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* Letter of Mr. Hill, 'Linn. Trans.' vol. xiii.; *Mém. du Mus.*, tom. xv.; and of Professor Grant, *Ann. des Sc. Nat.*, tom. xviii.

The close and authentic demonstrations of Meckel were not sufficient however to dispel the doubts which still hung over the subject in the minds of some. It is hard to some natures to give up preconceived opinions, and M. Geoffroy St. Hilaire, who had subsequently dissected a female *Ornithorhynchus*, stoutly combated* the evidences adduced by Meckel of the mammiferous nature of the animal, and brought the whole of his acumen to bear on the inferences of the latter, in his attempt to invalidate them. He denied that the subcutaneous glands pointed out by Meckel were mammary, urging that they had none of the characters of a true mammary gland—that he had compared them with the same parts in the human subject and in the Marsupials, and that their texture was totally different—that they consisted of a multitude of cæcums placed side by side, and all directed to the same point of the skin, where were to be seen only two excretory orifices, and these so small that the head of the least pin would not enter them, and that there was no trace of nipples. He further stated that in the individual examined by him, which had the appearance and proportions of an adult female, the gland was not more than one-fourth as large as in Meckel's specimen, observing that when a mammary gland is fully developed, an enlargement of all its constituent parts is effected, and the nipple acquires additional size even before the commencement of lactation, and remarking that no such appearance has been noticed in *Ornithorhynchus*. Professor Geoffroy, having thus denied the inferences of Professor Meckel, had to account for the use of these glands, and he considered them as analogous to the glands upon the flanks of aquatic reptiles and fishes destined to secrete a lubricating fluid, or to the odoriferous follicles of hairy quadrupeds, more especially those on the sides of the abdomen in the Shrews.

To these assertions Professor Meckel replied, and was supported by Professor Von Baer.

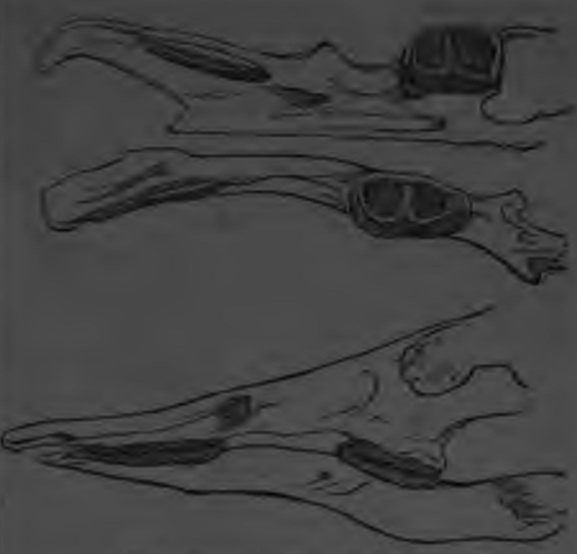
We now arrive at the highly interesting papers of Professor Owen, which may be considered as having settled this much agitated question. The first of these, 'On the mammary glands of the *Ornithorhynchus paradoxus*,' was read before the Royal Society (21st June, 1832), and is published in 'Phil. Trans.' for 1832, part ii.; the second, 'On the ova of the *Ornithorhynchus paradoxus*,' was read before the same Society on the 19th June, 1834, and is published in 'Phil. Trans.' for 1834, part ii.; and the third, 'On the young of the *Ornithorhynchus paradoxus*,' was communicated to the Zoological Society of London, on the 27th May, 1834, and is published in the first volume of the 'Transactions' of that Society. We say no more of these excellent memoirs here, as we shall presently have occasion largely to draw upon them.

ORGANIZATION.

The dental formula of Ornithorhynchus may thus be stated:—molars, $\frac{2-2}{2-2}=8$.

It is to be borne in mind that these organs are not true teeth; their structure will be explained under the section which treats of the *digestive organs*; but as they perform, as far as their conformation will allow, the offices of teeth, and are placed in the situation usually allotted to the *molares* in Mammals, the expression 'dental formula' is not inapplicable.

Skeleton.—The *cranium*, though widely differing from that of other mammals, approaches more closely to the general type of that class, as Cuvier observes, than to any other. It is rounded, wider than it is high, and without either sagittal or occipital crest. It is narrowed and flattened between the orbits, which are small and directed upwards. The muzzle afterwards becomes flattened and widened again, and presents on each side a small hook or process above the suborbital hole; it then becomes bifurcate, and its two flattened and slightly-divaricating branches terminate each by an involute kind of hook. The zygomatic arches are rectilineal and high vertically, and at their upper border is a marked post-orbitary apophysis. Under their anterior base the maxillary bone forms a nearly horizontal flattened surface, to which the two molars adhere. Their posterior base above the glenoid facet is pierced with a hole which communicates from the temple to the occiput. The entire palate is plain, and is continued (narrowing suddenly behind the molars) to the oval holes; up to this point the septum of the nostrils remains bony. The tympanic cavities are very small, and hidden as it were under the mastoid apophysis in the form of a small crest. Cuvier could only detect in his specimens two clear sutures; that which divides the anterior hooks, and that which separates the maxillary from the palatine bones. The position, the implantation of the teeth, and the passage of the suborbital canal well define the maxillary bone. The hook-like bones, which are as it were set in them anteriorly, appear to be the intermaxillary bones. Between them there is suspended, in the midst of the cartilages of the upper mandibles, a small bone, which has an upper plane divided into two by a furrow, a lower plane notched on each side, and a vertical plane uniting the two others. In the neighbourhood of this bone the nostrils are pierced, and it may be taken to represent the nasal bones and the palatine portion of the intermaxillary bones. In the anterior angle of the orbit is a very small lachrymal and a large suborbital hole. This last gives origin to a canal which opens in front of the small hook on the side of the muzzle; it is divided into two by the lateral cartilage of the beak. There comes besides from this canal a hole which opens in the palate under the preceding, and another which, after having formed a long canal, opens at the side of the intermaxillary bone, and consequently in the edge of the osseous beak. Between the first of these three suborbital holes, a little higher, is a small hole which communicates with the aperture of the orbit, pierced in front of the optic, and which Cuvier believes to be analogous to the anterior orbital hole. The first he thinks answers the supraorbital hole in man. The single hole analogous to the spheno and pterygo-palatine is pierced in the lower part of the orbit, a little behind the suborbital canal. It enters also in the nasal canal and in the palate near the first molar. The optic hole is very large and the spheno-orbital equals it; the oval hole is very large and distinct. Between the two oval holes are two membranous spaces. There are behind two very large holes at the place of the condyloidians, but Cuvier supposes that they comprise also the jugulars. Internally the inequalities are but little marked. The *sella*, which is but little elevated, is hollowed out in the middle by a longitudinal canal, and terminated backwards


Teeth of Ornithorhynchus. (F. Cuvier.)

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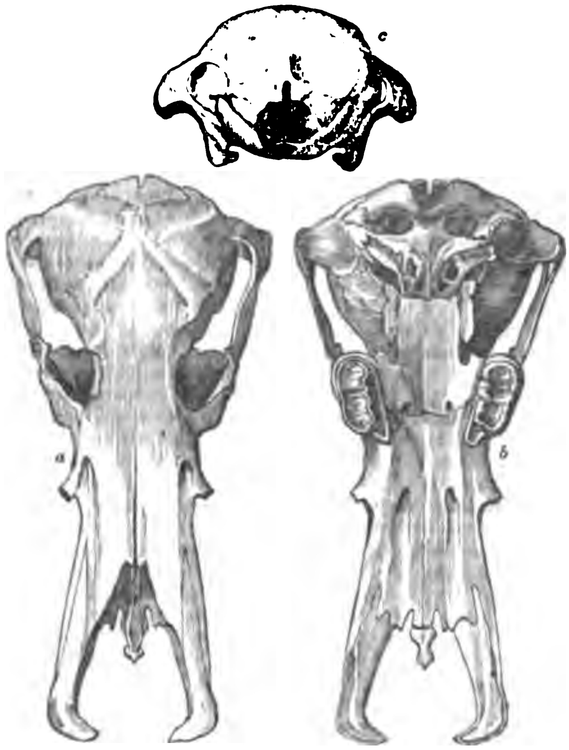
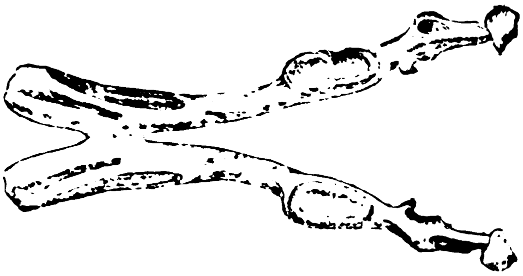
* Ann. des Sc. Nat. [illegible]

by a clinoid and very elevated lamina. The most curious internal part is the ethmoidal fosset, which is small and has only a single hole of no great size for the olfactory nerve, and perhaps another very small one; on each side are spaces, purely membranous, to separate it from the canal of the suborbital nerve. The three semicircular canals project far inwards and intercept a very remarkable hollow. Here may be traced many characters in which the skull of the *Ornithorhynchus* approaches those of birds. The bony *tentorium* is scarcely perceptible, but there is—and this is very remarkable—a large longitudinal osseous *falx*.

In the museum of the Royal College of Surgeons (*Physiological Series*, No. 1546, A) is a longitudinal section of the head, showing the bony *septum narium*, and some filaments of the olfactory nerve descending upon it; also the external nostril, the long nasal passage, with its anterior communication with the mouth by the *foramen incisivum*, and its posterior aperture beneath the *basis cranii*. In the cavity of the cranium may be observed the bony *falx*. (*Cat.*, vol. iii., part i.)

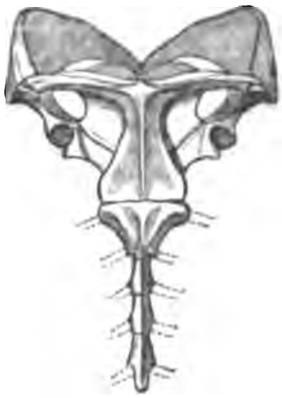


Skull of Ornithorhynchus.
a, seen from above; *b*, seen from below *c*, seen from behind.



Lower jaw of Ornithorhynchus, seen from above.

Anterior Extremities.—In both of the *Monotremes* the most remarkable part of their osteology is perhaps the shoulder, which answers to that of *Birds*, and still more to that of certain *Lizards*. The external surface of the *scapula* is concave, so that it is far from adapting itself to the ribs. Its form and relative position will be better explained by the cuts than by words. The whole of what may be termed the sternal apparatus appears to be formed more after the model of the Saurians than after that of the Mammals: deed it very much resembles that of the *Ichthyosaurus* THYOSAURUS, vol. xii., p. 431], and, like it, is admirably pted for an animal destined to collect its food at the om of lakes and rivers, and requiring machinery to enable it to rise continually to the surface for a supply of air.



Sternal apparatus of Ornithorhynchus two-thirds of the natural size.*

The bones of the arm and forearm, &c. have nothing so remarkable about them as to require particular description, especially as their conformation and relative position will be seen below; but it is deserving of notice that the *carpus* reminds the observer of the same part in the *Carnivora*. The number of the phalanges is the same as in the other mammals, two for the thumb and three for the fingers.

Posterior Extremities.—The pelvis and posterior limbs of the Monotremes are framed more according to the marsupial type; and the animal presents the supernumerary bones which are articulated to the pubis and embedded in the muscles of the abdomen, and are characteristic of that group. Their locality is the same and they are as well developed as in the opossum [MARSUPIALIA, vol. xiv., p. 458]: they are remarkable for the width of their base, which occupies nearly the whole of the anterior border of the pubis. But besides these marsupial bones there are in the external part of the pubis of the *Ornithorhynchus* two external pointed apophyses, one directed outwards, the other forwards. The *ossa ilii* are short, prismatic, and a little enlarged on their anterior border, the pointed tuberosities of the *ossa ischii* are directed backwards, and the *ischium* itself is not soldered to the sacrum as in the other *Edentata*; the three bones join as usual at the cotyloid fossa, but it is to be remarked that the *pubis* and *ischion* equally concur to form the *symphysis*, so that this part of the pelvis is very large and divided crucially by their suture. The oval holes are moderate and very nearly round. The cotyloid fossa is not notched on the side of the oval hole, but in the *Echidna* its bottom is not ossified, and a great aperture is left in that part of the skeleton. In the *Echidna* the *os sacrum* consists of three vertebræ; in the *Ornithorhynchus* it is composed of two only. The *femur* of the latter has no projecting crest, as in *Echidna*; in both animals it is short, wide, and very much flattened. The crests of the *tibia* are not strongly marked: that of the *Ornithorhynchus* is arched or bent, and the animal ordinarily turns its leg like the seals (*Phocæ*) and lizards, so that the nails are directed backwards, the *tibia* and the great toe being towards the outside, the *fibula* and the little finger towards the inside. The *fibula* is nearly straight, very distinct, and tolerably strong, and has on the outside of its upper extremity a large compressed apophysis which is elevated considerably above the head of the bone, offering an extensive surface for the insertion of the muscles. Here may be traced some analogy to the *Cheiroped Marsupials*, which also have the *fibula* very wide above and furnished with a supernumerary bone, which is elevated above the head of the *fibula*. In the *tarsus* the analogy is more to the mammals than the reptiles. In the *Echidna* there is an *astragalus*, an *os calcis*, a *scaphoid* bone, a *cuboid bone*, three *cuneiform* and two supernumerary bones; in the *Ornithorhynchus* there is one more, the *cuboid bone* being separated into two. The *os calcis* of the latter presents a short and blunt tuberosity, and its form is nearly square. The number of the bones of the five toes is the same as in the mammals, and the claws are more curved than those of the fore feet.

Bones of the Trunk.—Though the anterior part of the sternum and shoulder in the *Monotremes* bear a resemblance as those of the Lizards; the rest of that portion of the skeleton exhibits one common analogous to that of quadrupeds. The composition of the sternum is effected by successive pieces, and not by a cartilaginous dilatation as in the Saurians, or a disk composed originally of five pieces as in Birds. There are four of these pieces without reckoning either the Y-shaped bone or the xiphoid cartilage, which in the Ornithorhynchus is ossified and forms a fifth, making six in all. The piece which immediately follows the Y-shaped bone is larger than the others, and in the *Ornithorhynchus* exhibits traces of longitudinal division. The sternal portion of the ribs is ossified, as well as the other, as in Birds, and is joined to the sternum by a cartilaginous portion, but there is no recurrent apophysis to the dorsal ribs as in Birds. The sternal portion of the fifth and sixth ribs is very much dilated in the *Echidna*, and it is also very much dilated but not ossified in the five or six first false ribs; these dilatations extend as far as the eighth in the *Ornithorhynchus*, and become imbricated or laid over each other like tiles. In both genera the three last false ribs have only very small inferior portions. In *Echidna* there are six true and nine false ribs on each side; in *Ornithorhynchus* there are two more false ribs, but only two lumbar vertebræ, whilst *Echidna* has three. Both genera have seven cervical vertebræ, like the rest of the Mammals. In *Echidna* they are flat below, but have a sort of median crest in that direction in *Ornithorhynchus*, and in the latter, even in the adult state, may be still discerned the sutures which unite the transverse apophyses to the body of the vertebræ; here again is an analogy to the Reptiles. The four last dorsal vertebræ in the latter genus have also small inferior crests, which are wanting in *Echidna*; and in the caudal vertebræ a still greater difference exists; *Echidna* has only twelve, rapidly diminishing [illegible], whilst *Ornithorhynchus* has twenty at least, with large and dilated transverse apophyses, forming a depressed tail, which reminds the observer of that of the beaver. The spinous processes throughout have but little elevation, especially in *Ornithorhynchus*. The vertebræ, with the exception of those of the neck, do not retain the sutures which join their parts longer than those of other Mammals.

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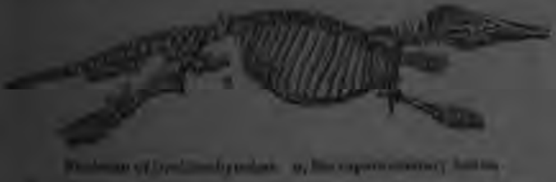
* This figure and the skeleton are taken from a specimen in the museum of the Royal College of Surgeons, by permission of the Museum Committee.

Bone of the Tongue.—It might have been expected that some traces of reptile organization would be found in the os hyoides, but that bone is constructed after the mammiferous type; it is indeed connected in a singular manner with the thyroid cartilage, which is itself singularly divided into four lobes. (*Ossemens Fossiles*, &c.)



Skeleton of Ornithorhynchus. a, the supernumerary bones.

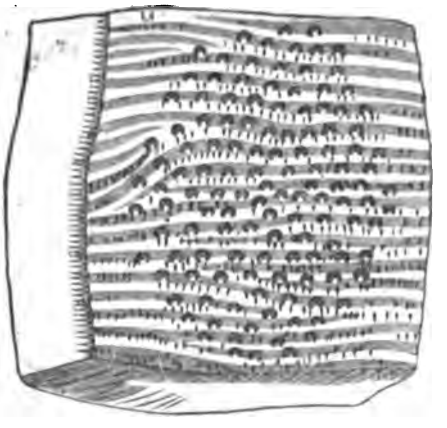
Digestive System.—In the museum of the Royal College of Surgeons in London (*Physiological Series*, No. 323, B) will be found the lower mandible and jaw, with the tongue, larynx, &c. of an *Ornithorhynchus*. On each side, between the coronoid process and the plicated membrane of the jaw, is a horny substance in the form of a molar tooth; that on the right side has been removed to show the vascular substance on which it is based, the elevations of which correspond with the surface of the tooth. Anterior to these are two other and more elongated horny ridges, which may be also considered as teeth. (*Cat.*, vol. 1.) The teeth in the upper jaw are of the same horny substance; the appearance and situation of both will be seen by a reference to the cuts at page 27. In the same museum and series, No. 533, A, is the stomach, in which the cardiac and pyloric orifices are closely approximated, as in the stomachs of birds. The greater part of the cavity extends beyond these orifices, and increases as it descends into the abdomen. The parietes are thin; the two layers of muscular fibres run in opposite directions, and are thickest along the curvature of the pylorus. No. 744, A, exhibits the cloaca. In this preparation the rectum is laid open posteriorly, to show its termination at the fundus of the outer or common cavity, just behind the orifice of the genito-urinary cavity; and two patches of glands are to be seen, one on either side of the anal orifice. The genito-urinary canal is laid open anteriorly, showing the orifice of the urinary bladder at its fundus, and those of the ureters and oviducts at its sides. White bristles are placed in the former, black ones in the latter, which are nearer the urinary bladder than the orifices of the ureters are. No. 541, C, exhibits the pyloric end of the stomach of *Echidna*. (*Cat.*, vol. 1.)

Generative System.—We must now direct the attention of our readers to the mammary glands, as connected with this part of the organization of the *Ornithorhynchus*.

In five apparently adult and full-grown *Ornithorhynchi* examined by Professor Owen, these glands presented as many different degrees of development. In one of the specimens they were even larger than in that dissected by Meckel, measuring in length respectively 5½ inches, in breadth 2, and in thickness half a line. In another specimen they did not exceed 1½ inch in length, and were only five lines in breadth and half a line in thickness. The other individuals exhibited mammary glands of sizes intermediate between these two. The number of lobes composing each gland amounted from 140 to 200; they were elongated, subcylindrical, disposed in an oblong flattened mass, and converged to a small oval areola situated in the abdominal integument, between three and four inches anterior to the cloaca, and about an inch from the mesial line. The lobes in the smaller glands preserved the same breadth to near the points of insertion, but in the larger ones they were broadest at the free extremity, measuring three or four lines across, and becoming narrower in about one-third from the point of insertion, where they ended in slender ducts. The lobes were almost all situated to the outer side of the areola, and consequently converged towards the mesial line of the body. The *panniculus carnosus* was interposed between the glands and the integument, closely adhering to the latter, but connected with the glands by loose cellular membrane. This muscle was here nearly a line in thickness; its fibres were longitudinal, and, separating, left an elliptical space for the passage of the ducts of the gland to the areola.

Portion of the Integument from the abdomen of Ornithorhynchus paradoxus with the hairs removed so as to exhibit the mammary areola. (Owen, *Phil. Trans.*)

Professor Owen further observes, that the areola (when the hair which covers it has been removed) can only be distinguished on the external surface of the skin by the larger size of the orifices of the ducts as compared with those for the transmission of the hairs, and, occasionally, by being of a deeper colour than the surrounding integument. The orifices of the ducts thus grouped form an oval spot, which in the specimen with the largest glands measured five lines in length and three in the short diameter. In that with the smallest glands the areola was traced with a lens to nearly the same extent in the long diameter, but it was much narrower. From the minuteness of the orifices of the ducts in the specimens with the small glands, the situation of the areola could hardly be detected without previously dissecting the gland; whilst in those in which the glands are fully developed, the areola is easily discovered on the removal of the hair by a practised eye. In none of the specimens examined by Mr. Owen was the surface on which the ducts terminated at all raised above the level of the surrounding integument; and he conceives that the elevation like a millet-seed in Meckel's specimen was accidental, and not essential to the structure of the part, Mr. Owen having observed similar risings in the integument at different distances from the areola, but not in the areola itself. The orifices moreover appeared of nearly equal sizes, nor any of them being calculated to suggest the idea of its being common to many ducts or lobules, as might be inferred from M. Geoffroy's description.

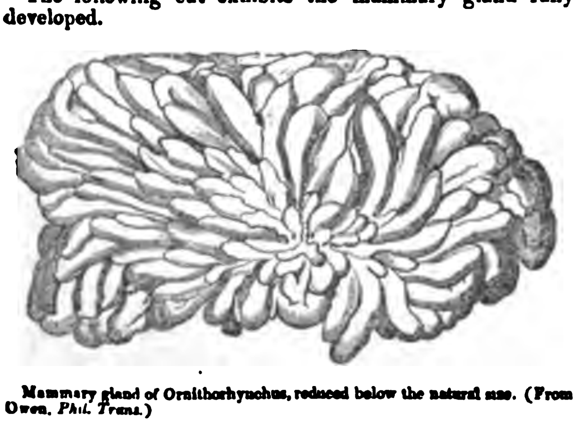


Magnified view of the mammary areola, showing the orifices of the ducts of the glandular lobules. (Owen, *Phil. Trans.*)

Professor Owen states that, on compressing the glands in a specimen in the museum of the Zoological Society of London, where they had arrived at the maximum of development, minute drops of a yellowish oil, which afforded neither perceptible taste nor smell, except what was derived from the preserving liquor, escaped from those orifices. An attempt to insert the smallest absorbent pipe into these orifices failed; but Mr. Owen, having thrust it into the extremity of a lobule, perceived, after a few unsuccessful efforts, the mercury gradually diffusing itself in minute globules through the parenchyma of the lobule; and at the distance of an inch from the place of insertion it had evidently entered a central duct, down which it freely ran to the areola, where it escaped externally from one of the minute orifices just described. This process was repeated on most of the lobes with similar results. Some of the lobules injected by the reflux of the mercury through the anastomosing duct were dried, and various sections examined microscopically by Mr. Owen produced the following results. At the greater end the lobules are minutely cellular; these cells become elongated towards the centre of the lobule, and, as it grows narrower, form minute tubes which tend towards and terminate in a larger central canal or receptacle from which the excretory duct is continued. When uninjected, the entire lobule might, Mr. Owen observes, be readily imagined to be composed of minute tubes; but he adds, that it is difficult to imagine how the lobules can have been considered as hollow cæcums or elongated follicles. On making a section of the corium through the middle of the areola, the ducts were seen by Mr. Owen to converge slightly towards the external surface; but there was no trace of an inverted or concealed nipple, as in the Kangaroo.

The differences in the state of the female organs of generation observed in the Ornithorhynchi, presenting the different conditions of the abdominal glands above described, were such as to indicate that the period of the full activity of those glands was subsequent to that of the uterine functions; whereas, on the hypothesis of their being scent-glands, the relation should have been reversed.

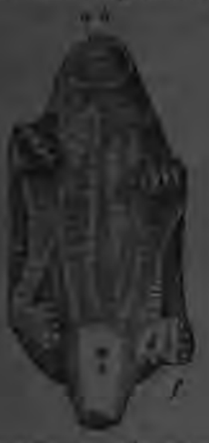
The following cut exhibits the mammary gland fully developed.



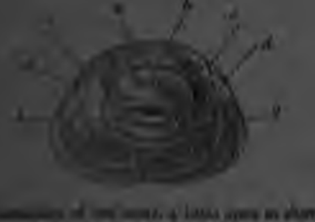
Mammary gland of Ornithorhynchus, reduced below the natural size. (From Owen, *Phil. Trans.*)

The passage of the seminal fluid in the male is by a distinct channel through the penis, though Cuvier denied this. (Dr. Knox and Sir Everard Home.)

The female organs are well displayed in the following preparations preserved in the museum of the Royal College of Surgeons. No. 2734, A (*Physiological Series*) exhibits the female organs and cloaca of an *Ornithorhynchus* in the unexcited state. The left ovarium, an irregular, semi-elliptical, flattened body, has a wrinkled and slightly granulated surface; it is attached to one angle of the wide aperture of the oviduct; the margins of the aperture are extremely thin, and are without fimbriations, as in the *Ovipara*. The wavy convolutions of the oviducts, and the comparatively straight course of the uteri as they pass along the connecting duplicatures of the peritoneum, are seen on both sides. The whole extent of the cloaca is laid open, showing the projecting thickened margins of the uterine orifices, between which is the outlet of the urinary bladder, where a bristle is inserted. Just below the junction of the rectum with the urethro-sexual canal are the orifices of the anal follicles, in two lateral groups. No. 2734, B, of the same series, shows the female organs and cloaca in a state ready for impregnation. The left ovarium is crowded with numerous ovisacs in various stages of development; two of which are conspicuously larger than the rest, and project in a greater part of their circumference from the surface of the ovary. One of these ovisacs (Graafian vesicles) has been laid open and the ovulum with the surrounding granular layer and fluid removed; the other remains entire. The peritoneal capsule of the ovary is divided and turned back from the ovary. The ovarian ligament and the junction of one of its extremities with that of the oviduct appear at the highest point in the preparation. The dilated commencement of the oviduct, or Fallopian tube, with its wide and simple slit-shaped aperture, are left entire. They are adapted to receive the whole ovarium. The contracted part of the oviduct is laid open, showing the irregularly wrinkled or flocculent character of its lining membrane. The right ovarium and ovarian ligament are extended in the preparation transversely below the left. The ovary, which presents itself as a slight granular enlargement of the ligament, contains, nevertheless, many perfect ovisacs and germinal vesicles, which might, possibly, be developed so as to be susceptible of impregnation. The right oviduct, which is much shorter than the left, presents a similar structure. Both uteri are laid open, and are equally developed: they are lined by a thick membrane disposed in very minute oblique wrinkles, and its different colour, due to its greater vascularity as compared with that of the oviduct, is still perceptible. The muscular tunic becomes stronger at the cervix, and continues to increase in thickness to the os uteri, which projects, like the os tincæ in ordinary Mammalia, and also, like the oviduct in the turtle (*Chelonia Mydas*), into the commencement of the urethro-sexual canal, and is traversed, in the virgin state, by a transverse band or hymen. Above and between the ora tincæ appears the orifice of the urinary bladder; and below them are the outlets of the ureters, in which bristles are inserted. This arrangement of those orifices corresponds exactly with that in *Chelonia*. The lining membrane of the urethro-sexual canal is disposed in irregular longitudinal rugæ, which slightly converge to the place of its junction with the rectum, which is seen at the back of the preparation. The common external passage of the cloaca is laid open, and the clitoris and its elongated preputium turned to one side: the bilobed clitoris is exposed at the back part of the preparation, and a bristle is passed through the preputial orifice, which is situated just within the anterior verge of the common external outlet of the cloaca. (*Cat.*, vol. iv.) This preparation is figured by Professor Owen, in *Phil. Trans.* (1832), pl. xvii., to which memoir we refer the student for further particulars. The season of copulation is at the latter end of September or the beginning of the month of October. The precise period of gestation and the condition of the excluded product, strictly speaking, still remain to be determined; but in the first week in December, Mr. G. Bennett found in a nest of an *Ornithorhynchus* three small naked embryos, not quite two inches in length, and which he therefore supposed, with apparently good ground, to have been recently born. The young *Ornithorhynchi* were not preserved, for want of the necessary means of preservation. But Dr. Hume Weatherhead presented to the Zoological Society of London two young specimens a little further advanced than those found by Mr. Bennett. They were of different sizes. The smallest rather exceeded two inches in length, measured from the end of the bill to the end of the tail in a straight line. The largest was double that size, and was one of the two young *Ornithorhynchi* taken with the mother from a nest on the banks of the Fish River by Lieut. the Honourable Lauderdale Maule, and kept alive for about a fortnight by that gentleman. These specimens were placed in the hands of Professor Owen for examination, and form the subject of his paper in the first volume of the *Transactions of the Zoological Society*. Our limits will not permit us to follow the Professor throughout this interesting memoir, to which we refer our readers; but there are some points which must be noticed. The stomach of the larger specimen was found full of coagulated milk. On carefully inspecting the whole contents with a lens, no portions of worms or insects could be detected; which, Mr. Owen observes, solves the doubt entertained by Lieut. Maule as to whether the mother nourished the young one with the food which was given to her for her own support, or with the secretion afterwards discovered to escape from the mammary pores; for the mother having been killed by accident on the fourteenth day after her captivity, it was observed, on skinning her while yet warm, that milk oozed through the fur on the stomach. A portion of the coagulated milk from the stomach of the young one was diluted with water and examined by Professor Owen under a high magnifying power, in comparison with a portion of cow's milk coagulated by spirit and similarly diluted. The ultimate globules of the *Ornithorhynchus's* milk were distinctly perceptible, detaching themselves from the small coherent masses to form new groups; the corresponding globules of the cow's milk were of larger size. With the milk globules of the *Ornithorhynchus* minute transparent globules of oil were intermixed. So far the experiment may be considered to have been decisive; but, to prevent the possibility of doubt, Professor Owen took a little mucus, and added a drop of water to it, when it instantly became opaque; and its minutest divisions under the microscope were into transparent angular flakes, entirely different from the regularly formed granules of the milk of the *Ornithorhynchus*.

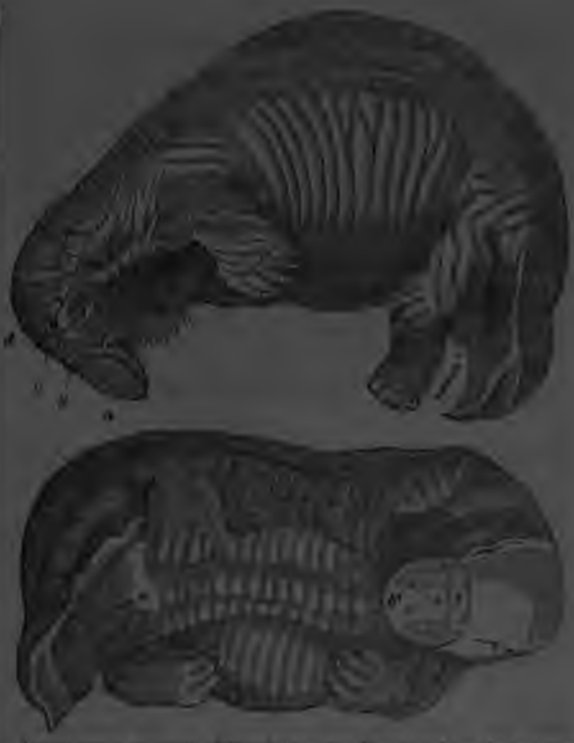


Under surface of young *Ornithorhynchus* (natural size): a, nostrils; b, prominence on the upper mandible; [illegible] f, the [illegible] and rudimentary spur of the hind foot.



[illegible] of the mouth a little open to show the tongue; a, nostrils; b, prominence of the upper mandible; c, the eyes; d, the [illegible]; g, the [illegible]; h, the tongue.

[illegible]



Larger young specimen of *Ornithorhynchus* (two views): a, the nostrils; b, the prominence on the upper mandible; c, the eyes; [illegible] [Owen, Zool. Trans.]

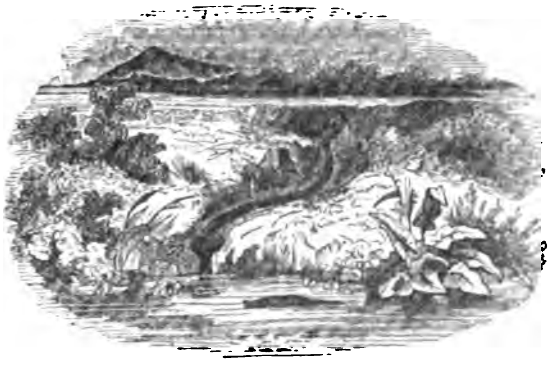
The circumstances particularly worthy of attention in these young animals are, the total absence of hair, the soft and flexible condition of the mandibles, and the shortness of these parts in proportion to their breadth as compared with the adult, as Mr. Owen pointed out. The tongue, which in the adult is lodged far back in the mouth, advances in the young animal close to the end of the lower mandible, and its breadth is only one line less in an individual four inches in length than it is in fully grown animals; a disproportionate development which is plainly indicative, as Mr. Owen remarks, of the importance of the organ to the young *Ornithorhynchus*, both in receiving and swallowing its food.

On the middle line of the upper mandible, and a little anterior to the nostrils, there is a minute fleshy eminence, *b*, lodged in a slight depression. In the smaller specimen this is surrounded by a discontinuous margin of the epidermis; with which substance therefore, probably from its having been shed, of a thickened or horny consistence, the caruncle had been covered. There is no trace of this structure in the upper mandible of the adult, and Professor Owen regards it as analogous to the fœtal peculiarity of the horny knob on the upper mandible of the *bird*. He does not however conceive that this remarkable example of the affinity of *Ornithorhynchus* to the feathered class is indicative of its having been applied, under the same circumstances, to overcome a resistance of precisely the same character as that for which it is designed in the young bird, since all the known history of the ovum of *Ornithorhynchus* points strongly to its ovoviviparous development. Lieutenant Maule's communication not only showed that the fluid secreted by the abdominal glands is milk, but also that the ova of *Ornithorhynchus* attain the size of a large musket-ball, and, like the eggs of the ovoviviparous reptiles, have a soft outer covering. The supposed portions of egg-shell found by Lieutenant Maule in the nest were probably portions of excrement, coated, as in birds, with the salts of the urine, that secretion and the fæces being expelled by the same orifice. The situation of the eyes, *c*, is indicated in the young by the convergence of a few wrinkles to one point;

but the integument is continuous, and completely shrouds the eyeball. Upon this Professor Owen remarks that the absence of vision in the young animal affords strong evidence of its being confined to the nest, there to receive its nourishment from the dam; and this is, he observes, corroborated by the cartilaginous condition of the bones of the extremities, and by the general form of the body: the head and tail are closely approximated on the ventral aspect, requiring force to pull the body into a straight line; and he adds that the relative quantity of integument on the back and belly shows that the position necessary for progressive motion is unnatural at this stage of growth.

Nervous System and Senses.—The senses of hearing and seeing appear to be sufficiently acute in the adult *Ornithorhynchi.* Smell and taste must also exist in considerable perfection. (Ante, p. 30.) The extremities of the mandibles are probably endowed with an acute sense of touch.

Food, Habits, &c.—Lieut. Maule fed the female which he kept in captivity on worms and bread and milk. Mr. G. Bennett, in his paper 'On the History and Habits of the *Ornithorhynchus paradoxus*' (*Zool. Trans.*, vol. i.), gives the following account of one when feeding, which he had secured by a cord fastened to the hind-leg:—'It was exceedingly lively, swam in the centre of the stream, and appeared in excellent health and spirits. The water at one part of the river being very clear, I saw its motions distinctly under the water. On diving, it sank speedily to the bottom, swam there for a short distance, and then rose again to the surface; it ranged the banks, guiding itself in its progress according to the impressions received by the mandibles, which appeared to me to be used by it as very delicate organs of touch. It seemed to feed well; for whenever it inserted its beak into the mud, it evidently procured some food from thence, as, on raising the head, after withdrawing the beak, the mandibles were seen in lateral motion, as is usual when the animal masticates. Although several insects were basking and fluttering about the surface of the water, close to it, no attempt was made to capture them, either from its not seeing them, or from its preferring the food which the mud afforded. The motions of the mandibles in this animal, when seeking its food in the mud and water, are the same as those of a *duck* when feeding in similar situations. After feeding, it would lie sometimes on the grassy bank, and at others partly in and partly out of the water, combing and cleaning its coat as usual with the claws of the hind feet. After permitting it to swim, feed, and clean itself for an hour, it was replaced, although with great reluctance on its own part, in its box: it did not however, as before, betake itself to repose, but commenced and continued a scratching on the sides of the box.' The same author states that these animals feed on the minute *Testacea* which may be found about the water-plants and in rivers. On examining the cheek-pouches or the stomachs of these animals, he always observed the food to consist of river insects, very small shell-fish, &c., which were constantly found comminuted and mingled with mud or gravel, probably to aid digestion. River weeds have also been found in their pouches, and the natives say they feed on them also. In the museum of the Royal College of Surgeons are preserved the débris of insects belonging to a genus of the *Naucerideæ*, which were found in the cheek-pouches of an Ornithorhynchus. (*Physiological Series*, No. 541, B.) We owe to Mr. G. Bennett, who has contributed so much to our knowledge of the natural history of this and other scarce animals, a description of the burrows of these extraordinary creatures. They were traced up a bank of a river, where, amongst some long grass, the entrance of a burrow was discovered, and the internal construction of it was laid open by digging. The entrance was large, particularly when compared with the width of the passage continued from it, measuring one foot three inches in depth, and one foot one inch in breadth. As it receded from the entrance, the burrow became narrower, being about the usual breadth of the animal when uncontracted. 'After having traced it,' continues Mr. Bennett, 'for the distance of ten feet four inches, and having just delved down upon it so as to perceive it still continuing its course up the bank, the beak and head of a *Water Mole* were seen protruding for an instant from the upper part, as if it had been disturbed from its repose, and had come down to see what we were about with its habitation. It only remained for an instant; for, as soon as it beheld us, * * it immediately turned up to take refuge in that part of the burrow which yet remained unexplored. In turning round however it was seized by the hind leg and dragged out. The animal appeared very much alarmed when it was hauled out of its subterraneous dwelling: it discharged its urine (which had rather a strong odour) and its fæces, when first caught, which I attributed to fear, for this is not usual with other living specimens that I have since seen. It uttered no sound, nor did it attempt to bite; and proved to be a full-grown female. When I held the unfortunate *Platypus* in my hands, its bright little eyes glistened, and the orifices of the ears were expanded and contracted alternately, as if eager to catch the slightest sound, while its heart palpitated violently with fear and anxiety. * * This animal uttered, when disturbed from its sleep, a noise something like the growl of a puppy, but perhaps in a softer and more harmonious key. Although quiet for the greatest part of the day, it made efforts to escape, and uttered a growling noise during the night.' But we must return to the burrow, the distance of the entrance of which from the water's edge was five feet. It ran up the bank in a serpentine course, approaching nearer to the surface of the earth towards its termination, at which part the nest, composed of dried grass, and weeds strewed over the floor, is situated; but none had been as yet made in this burrow. The termination, of the form shown in the cut, measured one foot in length by six inches in breadth. Mr. Bennett found the whole extent of the burrow, from the entrance to the termination, to be twenty feet by actual measurement. He observes that the burrows are situated above the usual river height, but do not appear to be above the extensive floods of the river, which frequently take place during the winter season.



Burrow of Ornithorhynchus. (Reduced from Bennett, *Zool. Trans.*)

The reader will find information of much interest in Mr. Bennett's paper, particularly with regard to the habits of two full-furred young ones, a male and a female, which he kept for some time. They were taken from the nest, which consisted of river-weeds, the epidermis of reeds and small dry fibrous roots strewed over the floor of the cavity, which was large enough to contain the mother and her young: these are from two to four in number, but most usually two.

Description.—Authors generally describe two species, viz. *Ornithorhynchus rufus*, and *Ornithorhynchus fuscus*; but the probability is that they are but varieties of one species, if indeed the difference may not be merely that of age or sex. The males are rather larger than the females, and Mr. Bennett considers the average length to be from 1 foot 6 inches to 1 foot 8 inches. A male shot in the Yas river measured, from the extremity of the mandible to the extremity of the tail, 1 foot 7¾ inches, and a female shot in the same river was 1 foot 7 inches, measured in the same way. The following is an abridgment of his description. *Body* depressed, partaking in some degree of the characters of the Otter, the Mole, and the Beaver, covered by a fine long thick hair, beneath which is a finer, short, very soft fur, like the two kinds of hair found in the Seal and Otter. Colour above, light black, varying in shades according as it is seen in a stronger or weaker light; beneath, where the fur and hairs are finer, ferruginous, varying in intensity according to age. *Tail* flat, broad, and inclining on each side abruptly off at the termination, beyond which the long hairs project; on its upper surface the hair longer and coarser than elsewhere. In young specimens its under surface, as well as the hind and fore legs near the feet, covered by fine silvery white hair. Below the inner angle of the eye (which is small, but brilliant and of a light brown colour) a small spot of light or pale yellow colour. External orifice of the ear situated near the upper part of the external angle of the eye. This orifice is seen with difficulty in dead specimens. *Head* rather flat; *mouth* furnished with two projecting flat lips or mandibles, resembling the bill of a *Shoveler Duck* [Duck, vol. ix., p. 179], the lower of which is shorter and narrower than the upper, and has its internal edges channelled with numerous *striæ*, resembling in some degree those seen in the bill of a *Duck*. The central portion of the mandibles is a bony continuation from the skull, and anteriorly and laterally a cartilaginous substance, partially moveable, extends from the bony portion to the distance of 3/8ths of an inch. Colour of upper mandible above, when seen in an animal recently taken out of the water, dull dirty greyish black, covered with innumerable minute dots, while the cartilaginous expansion around the mandible is smooth and soft. Under part of upper mandible pale pink or flesh colour, as well as the internal or upper surface of the lower mandible, the under surface of which last is sometimes white, sometimes mottled; the former mostly in young specimens; the latter usually in adults. At the base of both lower and upper mandibles a transverse loose fold or flap of integument, similar in colour to the skin covering the mandibles. This is continued in the upper mandible very nearly to the eyes.* *Feet* five-toed and webbed. In the fore-feet the web extends a short distance beyond the claws, is loose, and falls back when the animal burrows; claws strong, blunt, the two lateral shorter than the three middle ones. Hind-feet short, narrow, turned backwards, and, when the animal is at rest, somewhat resembling a fin; their action is backwards and outwards; first toe very short, and the nails of all curved backwards, and longer and sharper than those of the fore-feet; the web does not extend beyond the roots of the claws. The spur of the male (the female is destitute of this organ) is moveable, turned backwards and inwards, and situated some distance above the claws, and rather towards the internal part of the leg.

We cannot quit this part of the subject without calling the reader's attention to the beautiful organization of the *fore-foot of the Ornithorhynchus*. In the museum of the College of Surgeons (*Physiological Series*, No. 251, A.) one of these fore-feet is preserved, and the natatorial membrane will be seen continued for some distance beyond the termination of the toes, and gathered into folds at each toe. These folds are concave towards the palm, and are supported behind by the strong elongated claws, presenting a broad surface admirably adapted for striking the water with effect.

The spur of the male has been pretty generally considered as a weapon of offence and a very venomous one; but Mr. G. Bennett's experiments go far to prove that this idea is unfounded. He thus relates his experience in the case of a wounded male just taken out of the water: 'Having heard so much related about the injurious effects resulting from a puncture by the spur, I determined to avail myself of the opportunity to ascertain the correctness of the assertion. The wounded state of the animal presented no objection to the experiment, as in one published account, in which the poison is reported to have produced such terrible effects, the animal was also mortally wounded. As soon therefore as it became lively, I put its "poisonous spurs" to the test. I commenced by placing my hands in such a manner, when seizing the animal, as to enable it, from the direction of the spurs, to use them with effect: the result was that the animal made constant efforts to escape, and in these efforts scratched my hands a little with the hind-claws, and even, in consequence of the position in which I held it, with the spurs also. But although seized so roughly, it neither darted the spur into my hand, nor did it even make an attempt so to do. As however it had been stated that the creature throws itself on the back when it uses this weapon (a circumstance not very probable to those who have any knowledge of the animal), I tried it also in that position; but though it struggled to regain its former posture, no use was made of the hind claws. I tried several other methods of effecting the object I had in view, but as all proved futile, I am convinced that some other use must be found for the spur than as an offensive weapon. I have had several subsequent opportunities of repeating the experiments with animals not in a wounded state, and the results have been the same.'

Place in the System.—Dr. Shaw referred *Ornithorhynchus* to the *Bruta* of Linnæus, and Professor Blumenbach, less correctly, to the *Palmata* in his system, placing it between the *Otter* and the *Walrus*. Lamarck, Van der Hoeven, and Professor Geoffroy St. Hilaire characterized the *Monotremata* as a class intermediate between quadrupeds and birds. The base of the last-mentioned arrangement was the presumed want of mammary glands. Cuvier, as we have seen, more philosophically, admitted the forms into his 'Règne Animal' as a tribe or family of his order *Edentata*. M. de Blainville considered the *Monotremata* as most closely approximated to the *Marsupialia*. Meckel arranged them among the *Mammalia*, next to the *Edentata*. Mr. Gray, in his 'Outline,' placed *Echidna* and *Ornithorhynchus* in the 5th subfamily (Ornithorynchina*) of his 4th family (*Tatusiadæ*), This fifth subfamily being immediately preceded by the *Myrmecophagina*. J. B. Fischer, in his 'Synopsis,' arranges the two forms at the end of the *Bruta*, which are immediately succeeded in his work by the *Belluæ*. M. Lesson makes the *Monotremata* the second and last tribe of the order *Edentata*; and the same situation is assigned to them by Mr. Swainson. Mr. Owen arranges them in the *Ovoviviparous Subclass* of Mammals, and, in the course of his valuable papers, exhibits their affinities to birds, reptiles, the Marsupial animals, and the ordinary mammiferous type.

The following cuts are taken from Mr. G. Bennett's paper in the 'Transactions of the Zoological Society.'

Ornithorynchus feeding.

Ornithorynchus sleeping.

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* Mr. Bennett thinks that this may afford some protection to the eyes when the animal is engaged in burrowing or seeking its food. Mr. Everard Home considers that the latter are apparently destined to prevent the bill from being pushed into the mud and sand, beyond those parts.

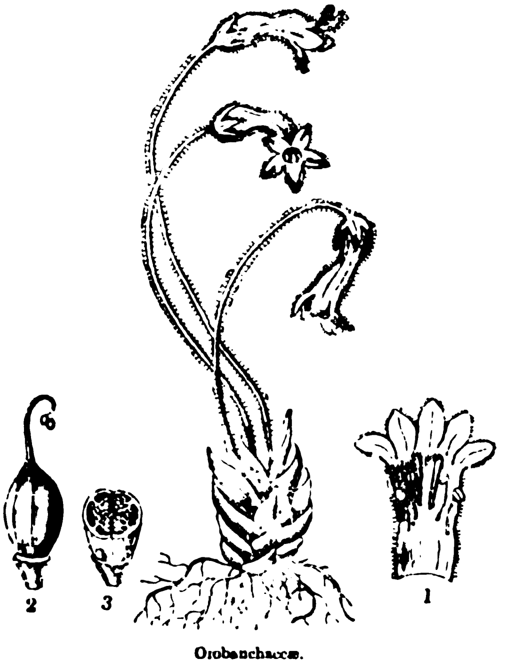
* Ornithorhynchina.

Ornithorhynchus combing itself with the claws of the hind-foot.

We cannot close this article without adverting to the subject of it as a satisfactory instance of the rapidity and accuracy of the progress of modern investigation. When this extraordinary animal was first brought over, we find Dr. Shaw, in 1799, noticing the scepticism with which it was received, not only as pardonable but laudable; almost doubting the testimony of his own eyes with respect to the structure of the animal's beak, yet confessing that he can perceive no appearance of any deceptive preparation; adding that the edges of the *rictus*, the insertion, &c., when tried by the test of maceration in water, so as to render every part completely moveable, seem perfectly natural; and concluding by a statement that the most accurate examination of expert anatomists could not discover any deception in that particular. The form is now as familiar to us as most of our European animals, and with regard to its organization and natural history, it is perhaps better known than many.

ORNUS. [MANNA.]

OROBANCHA'CEÆ are a natural order of Monopetalous exogenous plants, growing parasitically upon the roots of other species, and, as is very usual in such cases, producing no true leaves, but furnished with brown or reddish scales in their place. They have a didynamous structure, irregular flowers, and a superior ovary with four or more parietal placentæ, which spring up from the surface of the carpels in parallel lines covered with microscopical seeds containing a minute embryo lying in abundant albumen. On account of their didynamous monopetalous flowers, they are usually stationed by systematical writers in the vicinity of Scrophulariaceæ, but in many respects they correspond better with the typical form of Gentianaceæ. In this country the order is represented by the genus Orobanche itself, the various species of which, called Broomrapes, are found in fields, upon the roots of broom, furze, hemp, clover, bedstraw, &c. *O. rubra*, the handsomest of them, has hitherto been discovered only upon basalt and trap rocks in the Hebrides and adjacent shores, and near Belfast. The quality of these plants seems to be generally astringent, but they have been little investigated.



Orobanchaceæ.

plant of Anoplanthus uniflorus. 1, a corolla slit open: 2, the ovary with yle and stigma; 3, the same, cut across to show the placentation.

ORO'DES. [CRASSUS.]

ORONTES. [SYRIA.]

OROONOKO. [ORINOCO.]

ORO'SIUS, PAULUS, a presbyter of the Spanish church, was born in the latter part of the fourth century, probably at Tarracona. About A.D. 414 he proceeded to Africa, for the purpose, as it seems, of consulting St. Augustin on several controverted points of belief, which were then discussed by the sects of the Priscillianists and the Origenists, especially concerning the nature and origin of the soul. ('Consultatio sive Commonitorium Orosii ad Augustinum de errore Priscillianistarum et Origenistarum,' together with Augustin's answer, 'Ad Orosium contra Priscillianistas et Origenistas,' both in the collection of the works of St. Augustin.) From Africa, Orosius proceeded to Palestine with a recommendation from Augustin to Jerome, who was then living at Bethlehem. While in Palestine, Orosius wrote a treatise against Pelagius, who was at that time spreading his opinions concerning original sin and grace, 'Liber apologeticus contra Pelagium de Arbitrii Libertate,' which is annexed to the 'History' of Orosius. From Palestine, Orosius returned to Hippo Regius, to his friend Augustin, and from thence to Spain. He now began to write his 'History of the World,' a work which he seems to have undertaken at the suggestion of Augustin, to whom it is dedicated. The history ends with the year A.D. 416, about which time it appears to have been completed.

The calamities which had befallen the Roman empire, and above all the capture and pillage of Rome by Alaric, A.D. 410, afforded to the heathens and to Symmachus, among the rest, a pretence for accusing the Christian religion of being the cause of all those disasters, and of saying that since the abandonment of the old religion of the state, victory had utterly forsaken the Roman arms. It was for the purpose of replying to these accusations that Orosius wrote his history, which may be considered in part as an apology for Christianity against the Pagans, as the title, which has been found in several MSS., expresses,—'Adversus Paganos Historiarum libri vii.' In some MSS. the title is, 'De totius Mundi Calamitatibus;' in others, 'De Cladibus et Miseriis Antiquorum,' &c. The work consists of seven books, divided into chapters. It begins with a geographical description of the world, then treats of the origin of the human race according to the Book of Genesis, and afterwards relates the various accounts of the mythologists and poets concerning the heroic ages. Then follows the history of the early monarchies, the Assyrian, Babylonian, and Persian, the conquests of Alexander, and the wars of his successors, as well as the early history of Rome, the contents being chiefly taken from Trogus Pompeius and Justinus. The fourth book contains the history of Rome from the wars of Pyrrhus to the fall of Carthage. The fifth book comprises the period from the taking of Corinth to the war of Spartacus. Orosius quotes his authorities, several of which are from works which are now lost. The narrative in the sixth book begins with the war of Sulla against Mithridates, and ends with the birth of our Saviour. The seventh book contains the history of the empire till A.D. 416, including a narrative of the taking and sacking of Rome by Alaric, which was the great event of the age.

Orosius intermixes with his narrative moral reflections, and sometimes whole chapters of advice and consolation, addressed to his Christian brethren, and intended to confirm their faith amidst the calamities of the times, which, however heavy, were not, as he asserts, unprecedented. The Romans, he says, in their conquests had inflicted equal if not greater wrongs on other countries. His tone is that of a Christian moralist impressed with the notions of justice, re attention and humanity, in which most of the heathen historians show themselves deficient. He deprecates ambition, conquest, and glory gained at the expense of human blood and human happiness. As an historian, Orosius shows considerable critical judgment in general, though in particular passages he appears credulous, as in chap. x. of the first book, where he relates from report that the marks of the chariot wheels of Pharaoh's host are still visible at the bottom of the Red Sea. As an instance of the incidental value of the passages taken by Orosius from older writers, see Savigny, *Das Recht des Besitzes*, p. 176.

King Alfred made a free translation of the History of Orosius into the Anglo-Saxon language, which has been published by Daines Barrington, with an English version of it, 8vo., London, 1773.

One of the best editions of Orosius is that of Leyden, 4to., 1738, with Havercamp's notes.

ORPHEUS (Ὀρφεύς), a poet, musician, and philosopher, whose name is very prominent in the early legends of Greece. The traditions respecting him are remarkably obscure. According to Cicero (*De Nat. Deor.*, i. 38), Aristotle believed that no such person as Orpheus the poet had ever existed; but perhaps he only meant that the poems ascribed to Orpheus were spurious: he is mentioned as a real person by several of the early Greek writers—the lyric poets Ibycus and Pindar, the historians Hellanicus and Pherecydes, and the Athenian tragedians; he is not mentioned by Homer or Hesiod. Some antient writers reckon several persons of this name, and Herodotus speaks of two. In later times, a number of marvellous stories were connected with his name. The following is an outline of the legendary history of Orpheus. His native country was Thrace. It is a remarkable fact that most of the legends respecting Greek civilization are connected with the Thracians, who, in later times, spoke a language unintelligible to the Greeks, and were looked upon by them as barbarians. Müller explains this by pointing out that the Thracians of these legends were not the same people as those of the historical period, but a Greek race, who lived in the district called Pieria, to the east of the Olympus range, to the north of Thessaly, and to the south of Emathia or Macedonia. ('History of the Literature of Greece,' in *Library of Useful Knowledge*, p. 26.) The time in which he lived is placed by all writers not long before the Trojan war, and by most at the period of the Argonautic expedition, about twelve or thirteen centuries before Christ. He was the son of Apollo and the muse Calliope, or, according to other accounts, of Oeager and a muse. The poets represent him as a king of Thrace, but the historians are generally silent about his station. According to Clemens of Alexandria, he was the disciple of Musæus, but the more common accounts make him his teacher. He was one of the Argonauts, to whom he rendered the greatest services by his skill in music; the enchanting tones of his lyre made the Argo move into the water, delivered the heroes from many difficulties and dangers while on their voyage, and mainly contributed to their success in obtaining the golden fleece. (Orphei *Argonautica*.) After the voyage, he returned to the cavern in Thrace in which he commonly dwelt. He is said by some authors to have made a voyage to Egypt before the Argonautic expedition.

Orpheus had for his wife a nymph, named Eurydice, who died from the bite of a serpent as she was flying from Aristæus. Orpheus followed her to the world beneath, and by the power of his lyre induced Pluto and Proserpine to restore his wife, but upon the condition that he should not look back at her till he had past the boundaries of Pluto's realm. He broke the condition, and she vanished from his sight.

His death is differently related. The most common account is that he was torn in pieces by the Thracian women at a Bacchic festival, in revenge for the contempt which he had shown towards them through his sorrow for the loss of Eurydice. (Apoll., i. 3; Virg., *Georg.*, iv. 454.) His limbs were scattered over the plain, but his head was thrown upon the river Hebrus, which bore it down into the sea as far as Lesbos, where it was buried. The Muses gathered up the pieces of his body, and buried them at Libethra, where the nightingale was said to sing over his grave more sweetly than in any other part of Greece. His lyre was placed by Jupiter among the stars.

The poets and scholiasts have attributed to Orpheus many great improvements in the condition of the human race. Nearly all the antient writers state that he introduced into Greece the knowledge of religion and the worship of the gods. The foundation of mysteries is ascribed to him. (*Aristoph.*, *Ranæ*, v. 1030; Eurip., *Rhesus*, v. 943; Plato, *Protag.*, p. 316.) Herod. (ii. 81) speaks of Orphic and Bacchic mysteries. These mysteries seem to have been different from those of Eleusis. [ORPHICA.] Some writers say that the Orphic mysteries were introduced from Egypt into Greece; others think that they sprung up in Thrace, and that they preceded the worship of Dionysus, which was of foreign origin, and that the destruction of Orpheus by the Bacchanals represents the victory of the new over the old religion. The foundation of social institutions and the commencement of civilization is ascribed to Orpheus. (Horat., *De Art. Poet.*, v. 391.) Aristophanes says that he taught men to abstain from murder (*Ranæ*, v. 1030). He is said to have been the author of many fables. A passage in an epigram, to which however no authority can be attached, ascribes to him the discovery of letters. (Fabric., *Bib. Græc.*, i., p. 173.) The discovery of many things in medicine is ascribed to Orpheus (Plin., xxv. 2); and the recal of Eurydice from the lower world is sometimes explained as referring to his skill in this art. He was said to have been a soothsayer and enchanter. In Lesbos there was a famous oracle of Orpheus. The most remarkable of the legends concerning him are those which relate to his skill in music. The fable that by the tones of his lyre he drew around him wild beasts, trees, and stones, is very old. When, according to a later story, he descended into the infernal regions to recover Eurydice, his music enchanted the world of shadows and suspended the torments of the damned. A share in the invention of the lyre is attributed to him: he received it from Apollo with seven strings, and added to it two more. According to Plutarch, he was the first who accompanied the lyre with singing. The fable that after his death his lyre floated to Lesbos, is a poetical mode of representing the skill of the natives of that island in lyric poetry. He is said to have embodied his religious and philosophical opinions in poems, but the works ascribed to him are without doubt spurious. [ORPHICA.]

ORPHEUS (Ornithology). [MERULIDÆ, vol. xv., p. 122; MOCKING BIRD.]

O'RPHICA, certain works falsely ascribed to Orpheus, which embodied the opinions of a class of persons whom Müller thus describes:—'These were the followers of Orpheus (οἱ Ὀρφικοί); that is to say, associations of persons who, under the guidance of the antient mystical poet Orpheus, dedicated themselves to the worship of Bacchus, in which they hoped to find satisfaction for an ardent longing after the soothing and elevating influences of religion. The Dionysus, to whose worship these Orphic and Bacchic rites (τὰ Ὀρφικὰ καλεόμενα καὶ Βακχικά, Herod., ii. 81) were annexed, was the Chthonian deity Dionysus Zagreus, closely connected with Demeter and Cora, who was the personified expression, not only of the most rapturous pleasure, but also of a deep sorrow for the miseries of human life. The Orphic legends and poems related in great part to this Dionysus, who was combined, as an infernal deity, with Hades (a doctrine given by the philosopher Heraclitus as the opinion of a particular sect); and upon whom the Orphic theologers founded their hopes of the purification and ultimate immortality of the soul. But their mode of celebrating this worship was very different from the popular rites of Bacchus. The Orphic worshippers of Bacchus did not indulge in unrestrained pleasure and frantic enthusiasm, but rather aimed at an ascetic purity of life and manners. The followers of Orpheus, when they had tasted the mystic sacrificial feast of raw flesh torn from the ox of Dionysus (ὠμοφαγία), partook of no other animal food. They wore white linen garments, like the Oriental and Egyptian priests, from whom, as Herodotus remarks, much may have been borrowed in the ritual of the Orphic worship.' ('History of the Literature of Greece,' in the *Library of Useful Knowledge*, p. 231, &c., where the reader will find a full account of the Orphic theology.)

Of the Orphic writers the most celebrated are Onomacritus, who lived under Pisistratus and his sons, and Cercops, a Pythagorean, who lived about B.C. 504. Works ascribed to Orpheus were extant at a very early period. Plato mentions several kinds of Orphic poems; but he intimates that they were not genuine. Aristotle speaks of them as the *so-called* Orphic poems (τὰ καλούμενα). In later times all manner of works on mysteries and religion were ascribed to Orpheus. There are also Orphic poems later than the Christian æra, which are difficult to be distinguished from those of earlier times. In Fabricius's 'Bibliotheca Græca' there is a list of the writings ascribed to Orpheus, of which the following are the principal.

1. Ἱεροὶ λόγοι (*sacred legends*), a complete system of Orphic theology, in twenty-four books; it is ascribed to Cercops and Diognetus, and is probably the production of several authors.

2. Τελεταί (*religious rites*, or *mysteries*), directions for worshipping and appeasing the Gods; probably by Onomacritus.

3. Χρήσμοι (*prophecies*). Similar works were ascribed to Musæus.

4. Βάκχικα, probably stories of Bacchus and his mysteries; ascribed to Arignotes, a pupil or daughter of Pythagoras.

5. Ἡ ἐς Ἀΐδου κατάβασις (*the descent to Hades*), a poem of great antiquity, ascribed, among other authors, to Cercops.

6. *Hymns*, also of high antiquity. In the time of Plato they were recited by rhapsodists at the public games. Onomacritus appears to have been the author of many of them.

7. *Of Stones*, their nature, and their powers against serpents and poisons, and for appeasing the anger of the gods.

8. *Argonautica*, a poem on the voyage of the Argonauts to Colchis; probably by Onomacritus; at least by some one not earlier than Homer.

9. *Fragments*, which have been carefully collected by Gesner out of Platonic and Christian writers. Most of them are of a later date than the Christian æra.

The following are the principal editions of the Orphic poems: 'Orphei Argonautica, Hymni, et de Lapidibus,' Gr., in H. Stephens's 'Poetæ Græci Principes Heroici Carminis,' 1566, fol.; Orphei Argonautica, Hymni, et de Lapidibus, curante A. C. Eschenbachio, cum not. erudit.,' Utrecht, 1689; Ὀρφέως ἅπαντα, 'Orphei Arg., Hym., de Lapid., et Fragmenta, cum notis Stephani et Eschenbachii, ex recens. et cum not. J. M. Gesneri,' Lips., 1764; 'Orphica,' by Schaeffer, Lips., 1818; ditto, by Hermann, Lips., 1805; 'Argonautica,' by Schneider, Jena, 1803.

Tiedemann's *Initia Philos. Græc.*, p. 1-100; Fabric., *Bib. Græc.*, i., p. 140, &c.; Clinton's *Fasti;* Funke's *Real. Schullexicon.*)

ORPIMENT. [ARSENIC.]

ORPINE is a succulent herbaceous plant, the Sedum Telephium of botanists, found abundantly in some parts of England in woods and thickets. It has oval serrated leaves, erect stems, and close carpels of purple flowers; and has some reputation for its astringency: the root and stem, boiled in milk, are a popular remedy for diarrhœa.

ORRERY. There are four planetary machines to which distinct names have been given, corresponding to the phenomena they are intended to exhibit, and which, when combined so as to derive their motions from a common origin, constitute what is now generally understood by an orrery. These machines are the Planetarium, Tellurian, Lunarian, and Satellite machine. The planetarium is a mechanical representation of the orbital motions of the planets about the sun, either in circles or ellipses, and with angular velocities either uniform or variable, according to the quality of the instrument. The tellurian and lunarian, when connected in their improved form, exhibit the motion of the moon about the earth and that of the earth about the sun, and the principal phenomena which accompany the changes in their relative positions, such as the succession of day and night and the variable length of both according to the season of the year, the eclipses of the sun and moon, the variations in the moon's latitude, velocity, and distance from the earth, the progressive motion of her apogee, and the retrogradation of her nodes, &c. The satellite machine is chiefly intended to represent the motions of Jupiter's satellites about their primary, combined with the motions of the latter about the sun. Instead of attempting a particular description of any one of these machines, which could only be rendered intelligible by reference to many diagrams, while the object would be much better attained by a simple inspection of the machine itself, we shall confine ourselves to a brief notice of their history and to the explanation of the general principles upon which the construction of modern planetary machines depends, referring our readers for more ample in- rmation to the article 'Planetary Machines' in Brewster's *clopædia*, contributed by the Rev. W. Pearson, formerly asurer of the Astronomical Society.

The origin of the term 'orrery' is thus given by Mr Desaguliers, in his 'Course of Experimental Philosophy,' 4to., London, 1734, i., p. 431. After stating his belief that Mr. George Graham, about the year 1700, first invented a movement for exhibiting the motion of the earth about the sun at the same time that the moon revolved round the earth, he remarks, 'This machine being in the hands of an instrument-maker to be sent with some of his own instruments to Prince Eugene, he copied it, and made the first for the late Earl of Orrery, and then several others with additions of his own. Sir Richard Steele, who knew nothing of Mr. Graham's machine, in one of his lucubrations, thinking to do justice to the first encourager, as well as to the inventor, of such a curious instrument, called it an *orrery*, and gave Mr. J. Rowley the praise due to Mr. Graham.'

Planetary machines were in use at a very remote period, and appear to have consisted for many centuries of moveable spheres having the earth in their centre: thus we read of the Chinese spheres said to have been made some 2000 years before the Christian æra, and more recently of the spheres of Archimedes and Posidonius, concerning which Cicero, speaking of the Epicurean philosophy, has the following remarkable passage:—

'If the sphere, lately made by our friend Posidonius, which marks the course of the sun and moon and the five wandering stars, were to be transported into Scythia or Britain, who, even in those barbarous countries, would doubt whether reason had presided over its construction? Yet these people (the Epicureans) doubt whether the universe, whence all things arise and are made, is not the effect of chance or of some necessity rather than of reason and a divine mind; and they regard Archimedes as more deserving of praise in imitating the changes of the sphere than nature in producing them.' (*De Nat. Deor.*, lib. ii., cap. 34 and 35.)

The earliest machine which represented the Ptolemaic system may possibly have been that possessed by Chromatus, in the construction of which no less than 200 pounds weight of gold are said to have been used. This system continued to be represented in all planetary machines till about fifteen years after the death of Copernicus, when the last of that kind of any note was erected in the library of the Pantheon at Paris by Oronce Finée.

In the latter part of the seventeenth century Huyghens and Roemer employed themselves in the construction of planetary machines in conformity with the Copernican doctrine. The one invented by Huyghens, who first introduced a systematic method of calculating with precision the necessary wheel-work for these machines, received from its author the name of 'the Automaton.' It derived its motion from a spring regulated by a balance, the pendulum not having been then introduced as a regulating agent, and served for many years as a pattern in the construction of orreries, as did the instrument of Roemer, called by him a Planetarium, in the construction of machines intended chiefly to exhibit the orbital motions of the planets. Roemer had also invented a satellite machine prior to the year 1679, the original or a copy of which was presented by him in that year to the English astronomer Flamsteed. Both his machines are described in his 'Basis Astronomiæ,' printed in 1735. The last machine we shall mention is the Planetarium of the Royal Institution of London, constructed about the year 1801, shortly after Dr. Garnett, having previously removed his apparatus elsewhere, discontinued his astronomical lectures at that institution. For a description of this machine, the plan of which was suggested by Dr. Young and the Rev. W. Pearson, we must again refer to the paper 'On Planetary Machines,' by the latter gentleman.

The chief part of every orrery is the mechanism composing the planetarium, by means of which the paths of the planets about the sun and their relative periodic times are exhibited with more or less approach to truth; and this mechanism, with the method of computing it, being once understood, it will be easy to extend the same principles to the more complex cases in which the satellites revolve about their primaries at the same time that the latter rotate upon their axes and revolve about the sun, as well as to those in which the parallelism of the planets' axes and the changes in the positions of their orbits, &c. are sought to be represented. For this reason we shall confine ourselves to the method of computing the wheel-work, which will give the relative periods with any required degree of accuracy, and to the explanation of a very ingenious contrivance by means of which a true elliptic orbit may be produced. Before however proceeding to this, we would caution the purchasers of these expensive toys (those exhibited in the shops of mathematical instrument makers vary in price from sixteen to fifty guineas) against a defect which was at one time not uncommon and may still exist, and which, while it rendered them worse than useless, showed how little knowledge their inventors could have possessed of the science they are intended to illustrate. We allude to the substitution of the synodic for the sidereal periods, whereby each planetary ball was made to revolve about the sun in the time which ought to have elapsed between two consecutive conjunctions of such planet with the earth.

To produce the revolution of the planetary balls about the sun, a system of vertical concentric tubes is usually employed, which are adjusted very near to each other, but yet so far removed as not to influence each other's motion. These tubes are of different lengths, the innermost being the longest, and to the superior extremity of each a radius vector is attached, and thereby made to revolve once during each revolution of the tube. The lower extremities of the tubes form the arbors or axes of as many toothed-wheels, which are either immediately driven by pinions adjusted to a vertical axle called the 'annual arbor,' or derive their motions indirectly from those pinions by means of an interposed train of wheels. The determination of the relative number of teeth which must be given to the wheels and pinions in order to produce any required motion may be thus explained.

A pinion generally means a wheel consisting of a less number of teeth than that which it drives, but in the present article this restriction is unnecessary. The teeth of a pinion are called leaves. The number of revolutions made by the wheel during one revolution of the pinion by which it is driven, is found by dividing the number of leaves in the pinion by the number of teeth in the wheel:—thus, if there be 28 leaves and 7 teeth, the wheel will make $\frac{28}{7}$ or 4 revolutions during one revolution of the pinion; but if there be 7 leaves and 35 teeth, the wheel will make $\frac{7}{35}$ or $\frac{1}{5}$ of a revolution during one entire revolution of the pinion. If to the axle of the wheel be adjusted a second pinion, which drives a second wheel, and if to the axle of this wheel a third pinion be adjusted which drives a third wheel, and so on, then the number of revolutions made by the last wheel during one revolution of the first pinion will be found by multiplying together the number of leaves in the several pinions, and dividing the result by the product of the number of teeth in the several wheels:—thus if there be four pinions, having 7, 8, 9, and 10 leaves respectively, and the same number of wheels, having 20, 21, 22, and 23 teeth respectively, the number of revolutions made by the last wheel during one revolution of the first pinion will be $\frac{7 \times 8 \times 9 \times 10}{20 \times 21 \times 22 \times 23} = \frac{6}{253}$, or, in other words, the last wheel will revolve six times during 253 revolutions of the first pinion. Conversely the ratio which the product of the number of leaves must bear to the product of the number of teeth, in order to produce any required relative motion between the first pinion and the last wheel, is found by dividing the number of revolutions made by the wheel by the number of revolutions to be made in the same time by the pinion. The actual number of teeth to be given to the wheels and pinions, as well as the number of wheels and pinions to be employed in any particular case, is matter of convenience, not of necessity: in every instance the employment of a single pinion and a single wheel is theoretically sufficient, but in practice it is generally desirable to avoid the use of wheels or pinions with a very large or very small number of teeth. In the planetarium of the Royal Institution the number of teeth is in no instance under 7, or above 137. In a more complete instrument, constructed by Dr. Pearson in 1812, the limits were 14 and 251. The same gentleman recommends about 10 teeth to the inch, which he considers 'sufficiently strong, and not liable to unnecessary shake, when the teeth and spaces are made equal and at a proper depth for action.' The lowest number employed by him was 7 to the inch, the highest 15.

Supposing we wish the radius which carries the ball representing the earth to revolve once during each revolution of the annual arbor, it is only necessary that the wheel which is adjusted to the lower extremity of the earth's tube should contain the same number of teeth as the pinion by which it is driven, and which is adjusted to the annual arbor. In this case each revolution of the annual arbor will be the measure of one solar year. If each revolution of the annual arbor be required to represent any assigned portion of a year, the necessary modification in the relative number of teeth in the earth's wheel and pinion will appear sufficiently obvious from what has preceded; but for the sake of simplicity, we shall assume that the earth's radius vector revolves exactly once during each revolution of the annual arbor, and upon this supposition we have now to fix the relative number of teeth which should be given to the wheels and pinions which regulate the motions of the other planetary balls. It generally happens that the number of revolutions which the radius vector of any one of the planetary balls is required to make during one revolution of the annual arbor is expressed in the form of a decimal. Suppose, for instance, that the relative motion required were that of the earth and Jupiter. Jupiter revolves in 4332·5848 mean solar days; the earth in 365·2564 mean solar days; the number of revolutions made by Jupiter during one revolution of the earth is therefore $\frac{365{\cdot}2564}{4332{\cdot}5848} = {\cdot}0843045$. If this decimal be converted into a continued fraction by the rule given at page 462, vol. x., the resulting series of fractions, which approximate more and more nearly to ·0843045, will be found to be $\frac{1}{11}$, $\frac{1}{12}$, $\frac{7}{83}$, $\frac{29}{344}$, $\frac{94}{1115}$, &c., any one of which, according to the degree of accuracy required, may be taken for the ratio which the number of leaves in the pinion must bear to the number of teeth in the wheel, if only a single wheel and pinion be employed, or the ratio which the product of the number of leaves must bear to the product of the number of teeth, if a train of wheels and pinions be employed. If the first of these fractions, or its equivalent, $\frac{7}{77}$, be taken, the wheel attached to Jupiter's tube should contain 77 teeth, and the pinion attached to the annual arbor by which it is driven should contain 7 leaves, and Jupiter's radius will then revolve once during 11 revolutions of the annual arbor, that is, in 365·2564 × 11 = 4017·8204 days, which is less than the true period by 314·7644 days. In the same manner may be found the time in which Jupiter's radius will revolve when any of the other fractions are taken, as under:—

$$\begin{array}{r} \text{days.} \\ 365{\cdot}2564 \times \end{array} \left\{ \begin{array}{lll} & \text{Period produced.} & \text{Error.} \\ & \quad\text{days.} & \quad\text{days.} \\ \frac{11}{1} & = 4017{\cdot}8204 & 314{\cdot}7644 - \\ \frac{12}{1} & = 4383{\cdot}0768 & 50{\cdot}4920 + \\ \frac{83}{7} & = 4330{\cdot}897 & 1{\cdot}688 - \\ \frac{344}{29} & = 4332{\cdot}699 & 0{\cdot}114 + \\ \frac{1115}{94} & = 4332{\cdot}562 & 0{\cdot}023 - \\ \&c. & \&c. & \&c. \end{array} \right.$$

The third of these fractions, or rather its equivalent, $\frac{166}{14}$, was the one employed by Dr. Pearson in the construction of his new planetarium; so that in that instrument the wheel attached to Jupiter's tube contains 166 teeth, and is driven by a pinion of 14 leaves attached to the annual arbor. In the planetarium of the Royal Institution, a train of wheels and pinions represented by the compound fraction $\frac{111}{22} \times \frac{94}{40}$ was employed, which therefore gives a period of $365{\cdot}2564 \times \frac{111}{22} \times \frac{94}{40} = 4330{\cdot}778$ days. The following table affords a general view of the wheel-work of the last-named instrument. The denominator of the former of the two fractions in the second column denotes the number of leaves in the pinion attached to the annual arbor; the numerator, the number of teeth in the wheel which it drives. The denominator of the second fraction denotes the number of leaves in the pinion attached to the axle of the last-mentioned wheel; the numerator, the number of teeth in the wheel driven by this pinion, which wheel is attached to the lower extremity of its appropriate planetary tube.

		Periods produced. days.	True periods. days.	Error. days.
Mercury. .	$\frac{22}{90}\times\frac{67}{68}$	87·972	87·969	0·003 +
Venus . .	$\frac{32}{113}\times\frac{63}{29}$	224·705	224·701	0·004 +
Earth* . .	$\frac{60}{60}\times\frac{60}{60}$	365·256	365·256	0·000
Mars . . .	$\frac{56}{53}\times\frac{89}{50}$	686·958	686·980	0·022 −
Ceres } . .	$\frac{121}{21}\times\frac{48}{60}$	1683·658	1681·393	2·265 +
Pallas }			1686·539	2·881 −
Jupiter . .	$\frac{111}{22}\times\frac{94}{40}$	4330·778	4332·585	1·807 −
Saturn†. .	$\frac{124}{7}\times\frac{98}{59}$	10747·207	10759·22	12·01 −
Herschel .	$\frac{105}{7}\times\frac{67}{12}$	30590·22	30686·82	96·60 −
Sun† . . .	$\frac{19}{137}\times\frac{25}{12}$	25·418	25·	·418 +

The planets Vesta and Juno had not been discovered at the time this machine was constructed.

The contrivance by means of which a true elliptic orbit may be produced is extremely simple. For this purpose all that is necessary is that the radius vector which connects the planetary ball with the superior extremity of the tube should consist of two parts or arms, the lengths of which have a determinate ratio dependent solely upon the eccentricity of the orbit, and that while the larger arm revolves about the *centre* of the ellipse by means of the wheel-work already described, the smaller arm be made to revolve about the extremity of the larger with the same angular velocity but in the opposite direction. This may be effected in two ways. By means of a pulley *fixed* to the planetary tube and connected by an endless silken cord with another pulley free to revolve about a vertical axle situated at the extremity of the larger arm. The effect of this connection will be that the latter pulley will revolve once during each revolution of the larger arm but in the opposite direction. If therefore the smaller arm be attached to this pulley it will revolve in the manner required. The same motion may be produced by employing a double pinion extending the entire length of the larger arm and communicating the rotatory motion given to it at one extremity, to the axle of the smaller arm situated at the other. Let R and r denote the lengths of the larger and smaller arms respectively, and let the line joining the position of the sun and the centre of the concentric tubes, considered as the origin of co-ordinates, be taken for the axis of x. The aphelion of the orbit will be the point $(R+r, o)$. Also let θ denote the inclination of the larger arm to the axis of x at any moment; then since the smaller arm revolves with the same angular velocity, but in the opposite direction, its inclination to the axis of x at that moment must be denoted by $-\theta$; and the coordinates of the extremity of the smaller arm, that is, of the position of the planetary ball, will be the sum of the projections of R and r upon the axes of x and y respectively. Representing these co-ordinates by x and y, we shall therefore have

$$x=R\cos\theta+r\cos\theta=(R+r)\cos\theta$$
$$y=R\sin\theta-r\sin\theta=(R-r)\sin\theta;$$

and eliminating θ between these equations, there results

$$\frac{x^2}{(R+r)^2}+\frac{y^2}{(R-r)^2}=1,$$

which is the well-known equation to an ellipse referred to its centre, and whose semi-focal and non-focal axes are respectively $R+r$ and $R-r$. If the excentricity e of the orbit be known the relation between R and r will therefore be determined by the equation

$$e=\frac{2\sqrt{R.r}}{R+r.}$$

The distance E, between the position of the ball representing the sun and the common centre of the tubes is expressed by

$$E=2\sqrt{R.r}.$$

This method is defective in two respects. The elliptic orbits described cannot have a common focus, or else the true relative lengths of the mean distances of the planets cannot be preserved; and secondly the true angular motions of the planets about the sun are not accurately represented. Dr. Pearson corrected in some degree the latter inequality by varying the size of the teeth of the wheels and pinions employed, but for the mere purpose of illustration this appears superfluous, since, after all, the most complete mechanical representation of the solar system that has yet been invented is far inferior to that which the student may form in his own mind from an attentive perusal of a good popular treatise upon the subject.

ORRERY, EARL OF. [BOYLE.]

ORSI'NI, an old and illustrious family of Southern Italy, which has had among its members several popes, many cardinals, and other distinguished individuals. Orso Orsini, of Petigliano near the lake of Bolsena, is mentioned as senator of Rome in the years 1190-1200. His son Giovanni Orsini Gaetani, which last was his mother's family name, left two sons: 1, Napoleone Orsini, Count of Tagliacozzo in the kingdom of Naples; and 2, Matteo, styled 'the Great,' senator of Rome, and lord of Anagni, Marino, Galera, and other fiefs in the Campagna of Rome. Matteo left several sons, one of whom, Giovanni Gaetani, became pope under the name of NICHOLAS III. A branch of the family entered the service of the Anjou kings of Naples, obtained high honours at that court, and the titles of counts of Nola and dukes of Gravina. The Orsini who remained in the Papal State were often at variance with the powerful family of COLONNA during the middle ages. The castle of Bracciano, on the lake of that name, was the chief residence of the Orsini. In January, 1505, Francis Orsini, duke of Gravina, and Paolo Orsini, were treacherously seized and strangled at Sinegaglia by Cesare Borgia, whilst the cardinal Orsini was poisoned at Rome by order of Cesare's father, Pope Alexander VI. By degrees the various branches of the Orsini became extinct, and their estates passed into other hands, with the exception of the Neapolitan branch of the dukes of Gravina, which still continues, the actual duke having married a daughter of the banker Torlonia, duke of Bracciano. The palace Orsini at Rome, a vast building, stands on the ruins of the Theatre of Marcellus. The family palace at Naples, belonging to the duke of Gravina, is one of the finest private buildings in that capital. (Imhoff, *Genealogies*; Moreri; *Almanach de Gotha.*)

ORSI'NI, FULVIO, said to have been an illegitimate member of the noble family of that name, was born at Rome about 1530, and became canon of St. John of Lateran. He was well versed in classical literature, both Greek and Roman, and collected a valuable library of MSS., which he bequeathed to the Vatican library. He was intimate with the cardinals Alexander and Edward Farnese, and was considered one of the first scholars of his age. He died at Rome, about the year 1600. He wrote several learned works: 1, 'Familiæ Romanæ quæ reperiuntur in antiquis Numismatibus, ab Urbe Condita ad tempora Divi Augusti, cum adjunctis Antonii Augustini Episcopi Ilerdensis,' fol., Paris, 1663; 2, 'Virgilius collatione Scriptorum Græcorum illustratus,' in which he points out the numerous passages in which Virgil has imitated or borrowed from the Greek poets; a very interesting commentary; 3, 'Selecta de Legationibus ex Polybio et Fragmenta ex Historiis quæ non extant Dionysii Halicarnassei, Diodori Siculi, Appiani Alexandrini, Dionis Cassii, &c.,' 4to., Antwerp, 1582, in Greek, with Latin notes, 4to.; 'Carmina novem illustrium Fœminarum Græcarum,' 8vo., Antwerp, 1568, and other minor publications.

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* The oversight alluded to in p. 39, that of mistaking the synodic for the sidereal period, does not appear to have been altogether avoided in the construction of the planetarium of the Royal Institution, the wheel-work of which is computed on the supposition that the earth completes its revolution about the sun in 365·242 days. This is the length of the *tropical* year, or the time which elapses between the earth's leaving the vernal equinox and its arrival again at that point of the ecliptic; and is, owing to the precession of the equinoxes, less than the earth's sidereal period.

† In the descriptions of the planetarium of the Royal Institution, to which we have been able to refer, the wheel-work of Saturn is represented by $\frac{127}{7}\times\frac{98}{59}$, and that of the sun by $\frac{19}{137}\times\frac{25}{62}$. The former would produce a period of 11007·22 days, the latter of 4·92 days. We have little doubt that the numbers we have substituted for 127 and 62 are those which were actually employed. It is necessary to observe that the train for producing the sun's rotation derives its motion directly from Mercury's tube, to which the first pinion of the train, ted by the number 137, is attached, thereby producing a period of $\frac{19}{137}\times$

days. days.
$\times 87\cdot972=25\cdot418$.

ORTA'LIDA. [Chalcides, vol. viii., p. 191.]

ORTE'LIUS, ABRAHAM, born at Antwerp in 1527, of a family originally from Augsburg, studied philology and mathematics, and became the first geographer of his age. After travelling through England, Germany, France, and Italy, he published his great work, 'Theatrum Orbis Terræ,' being a description of the globe, or universal geography. He was soon after appointed geographer to Philip II. of Spain. His other works are—1, 'Deorum Dearumque Capita ex veteribus Numismatibus;' 2, 'Aurei Sæculi Imago, sive Germanorum Veterum Mores, Vita, Ritus, et Religio;' 3, 'Itinerarium per nonnullas Galliæ Belgicæ Partes.' Ortelius was acquainted with most of the learned men of his age, and was particularly intimate with Justus Lipsius, who wrote his epitaph. He died in 1598. (*Sweert's Vita Ortelii*; Valere Andre, *Bibliotheca Belgica*.)

ORTHE'S, or **ORTHEZ,** a town in France, capital of an arrondissement in the department of Basses Pyrénées, 509 miles from Paris, on the road by Poitiers, Bordeaux, and Mont de Marsan to St. Jean Pied de Port and Pamplona in Spain, and at the intersection of a cross-road from Bayonne to Pau. The town is pleasantly situated on the right bank of the Gave de Pau, which flows between steep banks of limestone. There is a suburb on the left bank, which communicates with the town by an antient Gothic bridge. On the only pier of this bridge is a tower. The streets of the town are well laid out, and the houses tolerably well built. There are some ruins of the antient castle of Moncade, on a height commanding the town. The population of Orthès, in 1831, was 5102 for the town, or 7121 for the whole commune; in 1836, it was 7857 for the commune. The townsmen carry on trade in salt provisions, especially hams. The manufacture of linen, especially of table-linen, flourished formerly, but has much declined; that of woollen stuffs and some hardwares is carried on. There are tanyards and currying-shops. The market for cattle and corn is considerable, and there are two large yearly fairs. Slate and coal are quarried in the neighbourhood, and sulphur and petroleum are procured. Six roads converge at the town.

This town was antiently subject to the viscounts of Dax, then to the princes of Béarn. Jeanne d'Albert, queen of Navarre, founded here a university for the Protestants, who then predominated in the town, and who still form a fourth or a third part of the inhabitants. They have a church; and there are a Bible Society, a high school, and several government offices.

A severe action was fought near this town 27th February, 1814, between the allied forces under the Duke of Wellington and the French under Marshal Soult. The French were strongly posted on the right of the Gave de Pau; but the Duke of Wellington, having brought seven divisions of British and Portuguese infantry and two brigades of cavalry to bear on the position of the French, dislodged them from all their posts, and obliged them to retreat. The French suffered great loss in killed and by desertion; the loss of the British was about 2300. (Duke of Wellington's *Despatches*.) Some French writers, as Malte Brun and Vaysse de Villiers, have given a very exaggerated statement of the number and the loss of the allies.

The arrondissement of Orthès contains 152 communes, and comprehends an area of 424 square miles; it is subdivided into seven cantons or districts, each under a justice of the peace. The population in 1831 was 84,667; in 1836, 87,459.

ORTHITE. *Silicate of Cerium, Iron,* &c. This mineral occurs in minute, slender, columnar imbedded masses. Fracture conchoidal; hardness 6·0, 7·0. Colour grey, inclining to black. Streak brownish grey. Lustre vitreous. Opaque. Specific gravity 3·288.

Before the blow-pipe swells and fuses into a blackish globule; with borax it gives a transparent glass. Gelatinises in acids and yields a solution of cerium.

It is found at Finbo, near Fahlun in Sweden, and also in Greenland, &c.

Analysis of the mineral from Finbo, by Berzelius:—

Silica	36·25	
Protoxide of Cerium	17·39	
Protoxide of Iron	11·42	
Alumina	14·00	
Lime	4·89	
Yttria	3·80	
Oxide of Manganese	1·36	
Water	8·70	
		97·81

ORTHOCE'RAS. [Polythalamacea.]

ORTHOGONAL. ORTHOGRAPHIC. The first of these terms, when not used in the same sense as the second, means simply perpendicular. Thus a curve cuts a set of curves orthogonally when it cuts them all at right angles.

Orthogonal or orthographic projection is that which is made by drawing lines from every point to be projected, perpendicular to a plane of projection. Thus if a plane were horizontal, and a point were to drop from a given position upon the plane, its last position would be the orthogonal or orthographic projection of its first. [Perspective.]

ORTHOGRAPHY. When this word is looked at in its elements (two Greek words denoting *the art of writing* and *correctness*), it would seem that there ought to be included under it whatever belongs to the art of writing a language correctly, including both what is called etymology and syntax. But the grammarians have given it a restricted sense, and it is used to denote not the writing correctly in the general, but the proper selection of literal elements of each word that is used, and the proper division of each word when one part of it is at the end of one line and another at the beginning of the line which succeeds. In the antient Hebrew manuscripts we may observe that this division of words never occurs, the scribes resorting to the expedient of widening certain of the letters, if in the ordinary form the words would not fill up the line. The law-stationers in their copies of legal documents fill up a line with a waved and unmeaning stroke, when the word which follows cannot conveniently be written in it at length.

We perceive by certain grammars and dictionaries published by practical men, both at home and still more in the United States of North America, that the writers appear to suppose that their works will be resorted to even by persons of cultivation as authorities or guides to orthography. But we believe it to be the case that the number is very few of persons who actually use dictionaries for this purpose. We mean of course not mere children or persons of very imperfect education, but even of those there are very few persons who read much and write occasionally, who ever think of resorting to books of the kind we are speaking of; and persons of a better education still trust entirely to memory, and should a doubt arise, the reference would be made to some eminent author and not to the guides of which we speak. In fact, the art is acquired almost without teaching, and is maintained in vigour through a whole life by the constant practice of writing and reading. At all events there is no book, grammar, guide, or dictionary, which a scholar in England regards as in this point a book of any authority.

Whether it would be expedient to raise some one work into an authority in such a point as this, is in fact a question —one of the greatest in philology that can be proposed— whether there shall be an invariable standard established to which a living language shall for ever conform. We doubt not only the possibility but the expediency of this: and in respect of orthography, we are quite sure that no such standard can be raised, because it would be quite impracticable to bring all persons who have a right to a voice in such a matter to an agreement in any one system involving the admission of certain fixed principles. The contemporary usage of persons of cultivation, meaning of a great preponderating majority, which will always exist, is, we apprehend, the authority to which each person who aspires to write correctly must continue to defer.

This has been the standard to which reference has always hitherto been made. Open any book printed in the reign of Queen Anne, and many words will present themselves in an orthography very different from that in which they would now be found. But we must not say that the persons who wrote them wrote incorrectly, if they wrote according to the practice of the cultivated persons of their time. If we ascend still higher and go to the reign of Elizabeth, we find the orthography still more diverse from our own; and when we reach the time of Caxton, and still more when we go back to the time of Chaucer and Wickliffe, we find many words which, though they are actually words now in use, are so disguised in their orthographical form that we can scarcely recognise them. We seem to have got among a people who spoke a different language, though they were our own forefathers, not more than ten or twelve generations above our grandfathers.

This has arisen from the want of a standard; something fixed, not varying like usage. There is an inconvenience in it as respects the writers before the time of Caxton and the invention of printing, and we may reasonably wish that with reference to them there had been some less varying standard and a continuous uniformity; but when we look in the writings of the men of the Elizabethan period, we find that though now two centuries and a half have passed, there is no more difficulty in perusing them than there is in perusing the writings of our own day; and that the same will be the case in respect of the writings of the present day in the hands of Englishmen four or five centuries hence, may be safely foretold. So that there is no real prejudice arising from the apparently unphilosophical and dangerous course of leaving this point to be regulated by anything so uncertain as contemporary usage.

At present the number of words of which the orthography is not uniform in all writings which aspire at once to be correct and devoid of affectation, is exceedingly small. Take this sentence and the whole of the paragraph which precedes it; is there any word, except this word *precede*, in which any variety would be found in the ordinary current writings of the day? Or if we found a variety, should we not say that the deviation from the usual practice was a casual mistake, a slip of the press, an affectation, or that it was the result of some peculiar principle which some peculiar person had adopted? And even this word *precede*, though it belongs to a class in which orthography is not uniform, we should probably very rarely find written in any other way, for few persons would prefer the form *preceed*, if indeed such a form is ever used. So that practically a great and perhaps quite sufficient degree of uniformity and stability may be said to be secured under the regulating power which now exists.

Dictionaries and vocabularies, as affording an easy guide to the knowledge of what is the usage, may have their use in this respect to a few persons who write occasionally only; but as authorities, we repeat, they are of no avail.

It has been matter of complaint that the orthography of the English language is not more uniform; that is, that words which are composed in whole or in part of the same elements are not uniform in the manner in which those elements are exhibited. Thus all words derived of the Latin *cedo* with prepositions prefixed, it may be said should be in one form, and it is a variety in defence of which nothing can well be pleaded that we should write *proceed* and yet write also *concede*. So with respect to such words as *honour*, *favour*, *odour*, *labour*, it may be said that there should be uniformity with other words like them, in which the *u* is not found, and further, that we should keep to the orthography of the Latin words of which they are forms equally in meaning and orthography. This appears plausible, but when it is considered that these words do not come to us *immediately* from the Latin, but have passed to us through the French, we recognise in the unnecessary letter *u* a part of the history of the word, which a person of true taste would scarcely be willing to relinquish for an advantage so trivial. Or take the rough word *through*: some may think that the three last letters may well be dispensed with, but they remain a pleasing evidence of the origin of the word in the rough and strong speech of our Saxon ancestors.

These little irregularities in orthography, like irregularities in other parts of grammar, are not to be regarded as evils. Such irregularities give birth to what are called *idioms*, in which no small part of the beauty of a language lies.

Attempts have however been made by ingenious men to introduce a greater degree of uniformity into our orthography. There is a treatise on the management of bees, printed about two centuries ago, in which we have a peculiar orthography on a system of the author's own. Ritson, in the last century, in some of his works adopted an orthography of his own. Professed writers on grammar have done the same; some of them to such an extent that the language, as written by them, can scarcely be known to be English. A more moderate reform is attempted by an American writer, Dr. Noah Webster, the author of an English Dictionary, which has been reprinted in this country; and Mr. Bromby of Hull, a learned and ingenious clergyman, has printed for private circulation a translation of the treatise of Plutarch concerning music, in which the orthography is regulated by certain principles which he lays down in the preface. But no writer who has made such an attempt has ever gained in any way the slightest share of public attention. Practically the usage is thought or found to be sufficient.

There is one point to which persons who take this view of the subject do not seem sufficiently to attend, and that is, the havock which any material changes in our orthography, so as to reduce it to some one system, would make in that beautiful poetry by which our language is ennobled, and which will preserve it at once from extinction and from any very material changes.

The words are in reality very few of which the orthography may not be said to be now *established* by the great *Jus et Norma Loquendi*, Custom. We take the following from a modern grammar, as being those which, in the opinion of the writer, are most frequently found with orthographical varieties:—

honour	honor
inquirer	enquirer
negotiate	negociate
control	controul
expense	expence
allege	alledge
complete	compleat
connexion	connection
abridgment	abridgement
surprise	surprize

Of course some of these represent classes. But what are these to the great body of such a language as ours? And with respect to the first and to the last, each of which represents a large family of words, we would submit that very few persons indeed who were entitled to a voice in a question of this kind would be found writing *honor*; and that there is a most excellent rule by which we imagine all persons of education allow themselves to be guided respecting words in *ise* or *ize*. The rule is this: when the word is a derivative of the French *prendre*, as is the case with *surprise*, *enterprise*, and one or two others, to write it with the *ise*; but when it comes to us from the Greek, as in *agonize*, and several other words, to keep the Greek termination ιζω—*Anglicè*, *ize*.

O'RTHONYX, M. Temminck's name for a genus of birds arranged by Mr. Swainson with *Buphaga* under *Buphaginæ*; these two genera forming the whole of that subfamily.

Generic Character.—*Bill* very short, straight, but the culmen arched from the base; sides considerably compressed. *Nostrils* large, basal. *Wings* moderate, but considerably rounded; the four first *quills* graduated, and shorter than the fifth. *Tail* rather lengthened, rounded; the feathers very broad, and the webs soft, but the shafts stiff, very rigid, and terminating in naked points. *Feet* enormously large and strong. The outer toe rather longer than the middle, which is again longer than the inner toe; hinder toe shorter than the middle. Tarsus longer than either of the toes. Claws strong, very slightly curved; the anterior all of the same length; the hinder one longest. (Sw.)

Geographical Distribution.—Australia only. (Sw.)

Example, *Orthonyx Spinicaudus*, Temm. *Orthonyx Temminckii*, Vig. and Horsf.

Description.—Rufous brown above, lineated with black; lesser coverts of the wings grey, streaked with brown; plumes of the top of the head slightly prolonged into a sort of false crest, which is however but little apparent: tail rounded, of a tarnished brown colour, each feather-stem terminated by a point furnished with small stiff bristle-like appendages. A bright orange patch covers the breast of the male, which part is white in the female.

Locality.—M. Lesson states that this bird is said to be a native of New Zealand. The specimen in the museum of the Linnean Society of London was presented by Mr. Brown, who met with it near Hat Hill in 1804.

Messrs. Vigors and Horsfield speak of this genus (*Linn. Trans.*, vol. xv.), which consists of the single species above noticed, as holding the same place in Australia as the true *Certhia* fills in the antient continent, and the numerous group of *Dendrocolaptes*, Herm., in South America. They observe that it possesses the strong and lengthened shafts of the tail-feathers which support the typical scansorial birds in climbing, and that it immediately connects the whole group by a strong affinity to the woodpeckers.

Mr. Swainson (*Classification of Birds*, vol. ii.), having described the foot of *Sclerurus*, the rasorial genus, in his opinion, of the circle of *Certhianæ*, refers to *Orthonyx* as the next modification. He describes the bird as rather larger than a sparrow, but with the general form and proportions of *Menura*, except in the tail. Like *Menura*, the

63). Its tail, however, is short, arched, and rasorial; the wings rounded, and the feet enormously large and strong. He notices the relative length of the toes as altogether peculiar, the outer one being equally longer (in a slight degree) than the middle one, while the two other claws, which are unusually straight in their curvature, are one-third as long as the toes; the hallux he describes as long as the middle toe, but having one-half its length occupied by the claw. Mr. Swainson thinks it quite obvious that claws so constructed were never intended to be used for ascending trees, and yet the rigidity of the tail would imply that this singular bird feeds in a perpendicular attitude, otherwise such a tail would be useless. The specimen before him when he wrote confirmed this supposition, for the ends of the feathers, or rather the shafts, were much worn away; and he conjectures, in the absence of information on the subject, that the habits of *Orthonyx* are terrestrial, that it is essentially a walking bird, but that it seeks its food not so much upon the bark of trees, as upon damp earthy banks, into which its unusually straight claws would penetrate, and against which the bird might be supported by its tail; and he thinks it also highly probable that these strong claws are used for scratching the ground, after the manner of rasorial birds. At all events he considers that the discovery of [illegible] establishes a link between *Dendrocolaptes* and *Orthonyx*, and he thinks that both are types of the *Rasores*, the one in the circle of the *Certhianæ*, the other in that of the [illegible].

[illegible]

[illegible]

ORTHOPTERA, one of the orders into which Insects are divided. This order, of which we have familiar examples in the common cockroach (*Blatta*), the house-cricket, and the grasshopper, is distinguished by the following characters: The superior wings are semi-coriaceous, usually displaying numerous nervures in a longitudinal direction, and having the interspaces filled up with transverse, or reticulated, smaller nervures: the anterior portion of the inferior wings is generally of a different substance from the posterior portion, the nervures are more crowded, and in character, and often even in colour, it nearly resembles the anterior pair of wings; the hinder portion of these wings is almost always more transparent, and, when not in use, is folded like a fan. The superior wings often overlap horizontally, as in the cockroaches, but in many species they meet at an angle like the roof of a house, as in the grasshoppers and locusts. The legs in some are formed for running; in others, the hinder pair of legs are very long and the thighs of these legs are thick, and in fact formed for leaping. The antennæ do not vary much; they are usually filiform; in many, extremely long and slender, in which case they are composed of innumerable minute joints; in others, they are shorter and thicker, and the joints are less numerous and consequently more distinct. The parts of the mouth are well developed and approach in structure those of the order Coleoptera; they are usually however less firm and compact, especially the labial apparatus. The upper portion of the prothorax is generally very large. The metamorphosis of the Orthoptera is semi-complete, that is to say, the larvæ and pupæ resemble the perfect insect, excepting that in the larvæ there are no wings, and in the pupæ the wings are in a rudimentary state. Some species however in the perfect state are wingless, in which case it is extremely difficult, and perhaps impossible, to distinguish the perfect insect from the pupæ or even the larvæ.

Latreille divides the order *Orthoptera* into two sections, to which he applies the names *Cursoria* and *Saltatoria*, or runners and jumpers. In the *Cursoria* all the legs are usually alike and fitted for running, and they are thus easily distinguished from the *Saltatoria*, in which the hinder legs are long and the thighs thick. The males of the species belonging to the second section have the power of producing a shrill noise, but this is not always effected in the same manner.

To the section *Cursoria* belong the families *Forficulidæ* (or Earwigs), the *Blattidæ* (Cockroaches), the *Mantidæ* (or Mantis tribe), and the *Phasmidæ*. The section *Cursoria* may be divided into three families—the *Gryllidæ* (of which the common House-Cricket affords an example), the *Locustidæ* (Locusts), and the *Acridiidæ* (or Grasshoppers).

The principal characters of these families are given under the proper heads; they may be distinguished by the following characters:—

A. Tarsi 3-jointed.	
a. Abdomen furnished with a forceps-like appendage	*Forficulidæ*.
b. Abdomen without forceps.	
* Antennæ filiform or prismatic .	*Acridiidæ*.
** Antennæ very long and setaceous	*Gryllidæ*.
B. Tarsi 4-jointed, antennæ setaceous .	*Locustidæ*.
C. Tarsi 5-jointed*.	
a. The prothorax the longest of the three thoracic segments . .	*Mantidæ*.
b. The prothorax the shortest of the three thoracic segments . .	*Phasmidæ*
c. The prothorax broad, more or less rounded, and generally covering the head	*Blattidæ*.

ORTHORHYNCHUS. [TROCHILIDÆ.]

ORTHOTOMUS. [SYLVIADÆ.]

ORTOLAN, the French and English names for a species of *Fringillidæ*, much esteemed by epicures for the delicacy of its flesh when in season. It is the *Hortulanus* of Gesner and others, *Miliaria pinguescens* of Frisch, *Emberiza hortulana* of Linnæus, *Ortolano* of the Italians generally, *Tordino Berluccio* of the Venetians, *Garten Ammer* and *Fettammer* of the Germans, and *Gerste Kneu* of the Netherlanders. Willughby writes the name *Hortulane;* and Montagu terms it the *Green-headed Bunting.*

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* In one genus which is placed in this family ([illegible]) the posterior tarsi have only three joints.

Description.—Male. Throat, circle round the eyes, and a narrow band springing from the angle of the bill, yellow; these two yellow spaces being separated by a blackish grey dash; head and neck grey, with a tinge of olive and small brown spots; feathers of the upper parts reddish on their edges and black in the middle; breast, belly, and abdomen reddish bay, all the feathers of those parts being terminated with ash-colour; tail blackish, a considerable portion of the two external feathers white on their internal barbs; bill and feet inclining to flesh-colour; iris brown. Length rather more than six inches.

Female smaller; band above the eyes and throat pale yellow; breast marked with large brown spots; the other parts below of a whitish rust-colour; a number of brown spots on the head and neck; all the upper parts less deep in colour than in the male.

Young before the first moult.—The yellow on the throat but slightly visible and tinged with greyish.

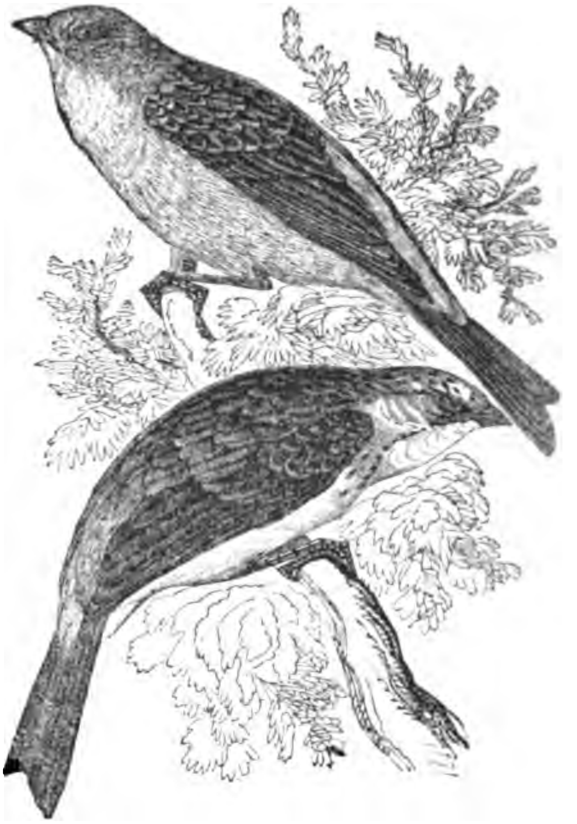
Varieties.—Pure white. The body partially white or whitish, or simply flecked with white; *Ortolan blanc* of Buffon. Other varieties (M. Vieillot enumerates six, one of which, variety C, has the head and neck green) are recorded; the *Emberiza Malbeyensis*, Sparrm., *Bruant de Malby*, Sonn., for example. In many the colours are deeper, and in some blackish or entirely black, apparently from the quality of the food, as when the bird has been fed with hemp-seed.

Food.—Millet and other farinaceous grain · insects, especially in the early part of the season before the grain is ripe.

Reproduction, Habits, &c.—The nest, which is constructed of fibres of plants and leaves, lined generally with fine grass and hairs, is very frequently found on the ground in corn-fields; though, according to circumstances, the bird varies its site, and it is placed also in hedges or bushes. The eggs, four or five in number, are reddish-grey streaked with brown; or bluish-white speckled and spotted with black. It haunts bushy places, or those situations where hedges abound.

Geographical Distribution.—The south of Europe may be considered the summer and autumnal head-quarters of the Ortolan, though it is a summer visitor in the central and northern parts. In Italy it is said to be common by Temminck and others. The Prince of Musignano states that it is found in the Sabine Mountains, but not commonly, in the summer, and that it rarely occurs in the plain of Rome, but that it is frequent in Tuscany. Lapland, Russia, Denmark, Sweden, and Norway are among the countries visited by it. In these islands it seems to be only entitled to rank as an accidental visitor, but it is by no means clear that it does not occur more frequently than is generally supposed; for, especially to an unpractised eye, it might be mistaken for the yellow-hammer, and in some states of its plumage for other Buntings. It has been taken in the neighbourhood of London; and one of these specimens was alive in 1837, in the aviary of the Zoological Society in the Regent's Park. Bewick's figure (*Green-headed Bunting*, last edition, Supp., p. 24) was captured at sea off the Yorkshire coast, in May, 1822. In Southern Europe it is common from May to August, and every spring and autumn may be observed at Gibraltar on its migration. Mr. Strickland saw it at Smyrna in April. North Africa is its winter residence. Colonel Sykes notes it in his Catalogue of the Birds of Dukhun (Deccan).

Utility to Man.—When properly fed, for which purpose there are large establishments in the south of Europe, where they are placed after having been trapped and furnished with plenty of millet-seed and other grain, till they become sheer lumps of fat, they are delicious morsels. Mr. Gould states that this is effected in Italy and the south of France in a *dark* room. The Prince of Musignano says, 'Nella vicina Toscana, dove gli *Ortolani* sono frequenti, si tengono nelle Uccelliere *illuminate giorno e notte* finche restano soffocati dalle pinguedine;' and he adds the following words, 'Carne squisita.'



Ortolan

Upper figure, male; lower figure, female. (Gould.)

O'RTYGIS. [Tetraonidæ.]

ORTYX. [Tetraonidæ.]

ORUS, or HORUS, an Egyptian deity, the son of Isis and Osiris, corresponds, according to Herodotus, to the Apollo of the Greeks, and was the last of the gods who reigned in Egypt. (Herod., ii. 144; Diod., i. 44.) Typhon, after the murder of his brother Osiris, sought to kill Orus; but his mother Isis, according to Herodotus (ii. 156), committed him to the care of Leto, who brought him up in the moving island of Chemmis, which was in the lake Buto. The Egyptian priests however in this instance, as well as in many others, appear to have been anxious to assimilate the history of their deities as much as possible to that of the Greeks. When Orus had grown up, he is said to have made war upon Typhon, whom he deprived of the kingdom of Egypt, and, according to some accounts, put to death. (Diod., i. 25; Herod., ii. 144; Plutarch, *De Is. et Osir.*, p. 358, Francfort, 1620.)

According to Diodorus (i. 25), Orus was killed by the Titans, and restored to life by his mother Isis, who conferred upon him immortality, and taught him divination and the healing art.

Orus is frequently represented as sitting in the lap of Isis. He appears also to be represented in some bronzes in the British Museum, which depict a man trampling on the crocodile, since we know that the crocodile was one of the symbols of Typhon. (*Egyptian Antiquities*, 12mo., Lond., 1836, vol. ii., p. 306.)

A work on Egyptian hieroglyphics has come down to us purporting to be written by Orus, or Horus, of which an account is given in the article Horapollo.

ORVET, the French name for the *Blindworm* (*Anguis fragilis* of Linnæus). [Blindworm.]

MM. Duméril and Bibron, who, in their recently published work ('Histoire des Reptiles,' tome v., 1839), place the form among the *Scincoidean Lizards*, and next to *Ophiodes*, state that up to the time of their publication all authors have denied an external auditory opening to the *Anguis fragilis*, Linn., whereas this Scincoidean has one, very small it is true, but distinct nevertheless when pains are taken to search for it, even without the aid of a lens. They state that this orifice, which is linear, and from one to two millimetres in length, is situated behind the commis sure of the lips at a distance equal to the length of the muzzle; sometimes it is uncovered, sometimes it is hidden under the scales; and in the latter case they must be raised before it is perceptible.

Mr. Bell, in his 'History of British Reptiles' (1839), places the form among the *Saurophidia* of Mr. Gray, and makes 'tympanum concealed' a part of the generic character. The former English zoologist remarks that the group to which the genus *Anguis* belongs (meaning of course as it is at present confined, namely, to the single species known vulgarly as the *Blindworm*, for the Linnean genus *Anguis* had a much wider range) is one of the most interesting in its relations of all the forms of the *Reptilia*. 'Under external characters considerably differing from each other,' says Mr. Bell, 'some possessing the limbs and integument of true lizards, and others wholly devoid of external members, and moving like true serpents, there are (in Mr. Gray's order *Saurophidia*) many points of mutual affinity which prevent the possibility of separating them from each other. From the well known families of the Skinks, or *Scincidæ*, with their true legs and five-toed feet, down to the present species and its immediate congeners, every possible gradation is to be found in the development of the anterior and posterior extremities. Agreeing, as they all do, in the Saurian character of the structure of the head, the consolidation of the bones of the cranium and face and the narrow and confined gape, so different from these parts in the true serpents, they yet approach the latter in the comparative length of the bodies, and in the gradual diminution and ultimate disappearance of the extremities.'

Mr. George Daniel, who kept a very fine Blindworm alive for nine weeks, found that when touched it would bite, though not sharply enough to draw blood, keeping its hold however till it was released. It drank sparingly of milk, raised the head when drinking, and fed upon the little white garden slug (*Limax agrestis*, Linn.), swallowing six or seven in succession; but it did not feed every day. Elevating its head slowly above the slug, the Blindworm suddenly seized it by the middle, held it thus sometimes more than a minute, then passed it through the jaws, and swallowed it head first. It refused larger slugs, young frogs, and insects; but snakes kept in the same cage took both frogs and mice. The Blindworm avoided the water, the snakes sought the pan in which it was kept, coiled themselves up there, and appeared to delight in it. When it cast its slough, the skin came off in separate pieces, splitting first on the belly, and that of the head peeled off last; the largest piece was two inches in length. (Note to Bennett's White's *Selborne*.)

Mr. Bell is of opinion that Blindworms in a state of nature do not live upon slugs exclusively; he found the remains of insects in the stomach, and adds that they will feed readily on earthworms six or seven inches long; but he denies that they can swallow small rats, mice, toads, and frogs.

The Blindworm is *ovoviviparous*, the eggs being hatched internally, and the young excluded alive. They are from seven to twelve or thirteen in number, and are produced in June or July, being each from 18 to 22 lines in length.

Mr. Swainson (*Natural History of Fishes, Amphibians, and Reptiles*, 1839) places the *Anguidæ* under the order of Serpents between the *Colubridæ* and the *Amphisbænidæ*, making the *Anguidæ* consist of the genus *Pseudopus*, *Ophisaurus*, *Anguis*, and the subgenus *Acontias*.

ORVIE'TO, ORIVETO, a town of the Papal State and a bishop's see, in the province of Viterbo, is built on a steep hill 1200 feet high, which rises above the river Paglia, an affluent of the Tiber; it is about sixteen miles north-east of Viterbo. The hill of Orvieto is of volcanic formation, and is detached from the calcareous ridge which divides the basin of the lake of Bolsena from the valley of the Tiber. The town contains 6000 inhabitants. (Calindri, *Saggio Statistico dello Stato Pontificio*.) It is chiefly remarkable for its handsome Gothic cathedral, begun towards the end of the thirteenth century, and finished towards the middle of the fourteenth. The façade, one of the finest in Italy, is ornamented with sculptures and mosaics. (Della Valle, *Stampe del Duomo rappresentanti il Duomo di Orvieto*, Rome, 1791.) One chapel, dedicated to the Virgin Mary, is painted by Luca Signorelli, who has represented the Judgment, Hell, and Paradise, with a curious mixture of heathen mythology and Christian imagery. The other chapel, which contains the corporal said to have been stained by the bleeding host at Bolsena, is very rich. [BOLSENA.] The other remarkable buildings of Orvieto are the town-house and the Jesuits' college, and a very deep well, excavated in the tufa rock on which the town is built, with steps to the bottom. The country around Orvieto is fertile, and produces a kind of delicate white wine, which is in great repute at Rome.

Orvieto appears to have no well founded claim to classical antiquity, though some antiquarians have pretended that it is the same as Oropitum, a town of the antient Etruscans, of which nothing more than the name is known. Orvieto was called Urbs Vetus in the time of the Longobards, and is mentioned by Paulus Diaconus, and by pope Gregory I. (Della Valle, *Storia del Duomo di Orvieto*, 4to., Rome, 1791.)

ORY'CTEROPUS. [AARD-VARK.]

ORY'CTERUS. [MURIDÆ, vol. xv., p. 516.]

ORYX. [ANTELOPE, vol. ii., p. 67.]

ORY'ZA, the name by which rice was known to the Greeks and Romans, and which has been adopted by botanists as the generic name of the plant yielding that valuable grain. The Greek name would appear to be derived from the Arabic *Aruz*, and this is allied to *Uri*, the Telinga name of cultivated sorts; but the Sanscrit names are *Vrihi*, *Dhanya*, *Vrihi*; the wild kind being called *Nivara*, while the great tanks are called *eraya* in the Tamul language. The European names are evidently all derived from the same sources, but the name *paddy* is applied to the rice in its natural state, or before being separated from the husk. The natives of India call it *dhan* in this state, as well as the plant, and the rice itself is called *chawul*.

The genus *Oryza* has two glumes to a single flower; paleæ two, nearly equal, adhering to the seed; stamens six, and styles two. Dr. Roxburgh describes two species: one, *O. sativa*, distinguished by its diffuse panicle; the other, *O. coarctata*, has the panicle contracted, the valvulets of the calyx subulate, and the leaves culm-clasping. This species is a native of the delta of the Ganges, and was first discovered there by Dr. Buchanan in 1796, but was not found to be applied to any use.

The common rice, *Oryza sativa*, unlike many long cultivated grains, is still found in a wild state in and about the borders of lakes in the Rajahmundy Circars, though never cultivated, because the produce is said to be small compared with that of the varieties in cultivation. The grain is however remarkably white, palatable, and reckoned very wholesome; hence it is carefully gathered, and sells dear. The rich esteem it a dainty, and, to make it still more delicate, boil it only in steam.

The Rice plant is therefore an undoubted native of India, from which country it has spread over a great part of the world, especially in Asia, where it forms the principal portion of the food of the inhabitants, but it has also from very early times been introduced into the southern parts of Europe. Theophrastus describes it in book iv., c. 5, with other Indian plants, and mentions it as growing in water, and that its inflorescence is like that of milium or panicum, and not in form of a spike. Adam Smith adduces it as one of the most prolific of grains. 'A rice-field produces a much greater quantity of food than the most fertile corn-field. Two crops in the year, from thirty to sixty bushels each, are said to be the ordinary produce of an acre.' Rice is now extensively cultivated in North and South Carolina, and in Georgia; also in Italy and the south of Spain, and likewise a little in Germany. The perfect system of irrigation and tillage which was introduced into Italy at so early a period no doubt rendered the cultivation easy, as the climate is also sufficiently hot and regular.

As the summer temperature of many countries is high, it is easy to cultivate an annual like rice where water is abundant and irrigation easy; but as the summer temperature of most European countries is too low, and not long enough continued, and far from regular, it is hopeless to attempt the culture of a grain which requires so much heat, and which has the disadvantage, from the moisture arising from irrigation, of making a country unhealthy; but this is not the case in the rainy season of tropical countries, where the rice-field is not much more moist than the rest of the country. Its culture has been attempted in England, and a small crop was raised near Windsor, on the banks of the Thames; and it has been hoped that the mountain rice, which is known to grow at considerable elevations in the Himalayan Mountains, might be suited to an English climate. This variety certainly requires a less degree of heat, but it seems to be forgotten that temperature is only one of the elements of climate, and that moisture may be supplied to a plant either by the soil or the atmosphere, and the latter may be moist when the former is comparatively dry. Rice is sown in the Himalayas only in places within the influence of the periodical rains, that is, from about the middle of June to the end of September. In some places it is irrigated, and in others it is not, but rain falls very frequently, and the air is almost always in a moist state, from being charged with moisture from the heated valleys, which is deposited on the mountains, when it reaches an elevation where it becomes cooled beyond the point of saturation. The temperature also is so uniform as not to vary 10° of Fahr. from 70° for three months. So in the Isle of France the mountain rice is cultivated only in the rainy season.

The rice so extensively cultivated throughout India (and the cultivation in China, as described by Sir G. Staunton, is very similar) depends upon rain or irrigation either from rivers or tanks. These Capt. B. Hall (*Frag. of Voyages*, vol. iii., p. 66) describes in one situation, near Nundydroog, as spread over a valley, which was from six to eight miles across, and that they were used for irrigating myriads of rice-fields. The embankments are sometimes miles in length, and then of a waving snake-like shape. One valley was pointed out to Captain Hall, about a mile broad and forty miles long from end to end, which included between thirty and forty tanks, every intermediate square yard of the intermediate spaces being richly cultivated, while the surrounding country appeared to be condemned to perennial sterility.

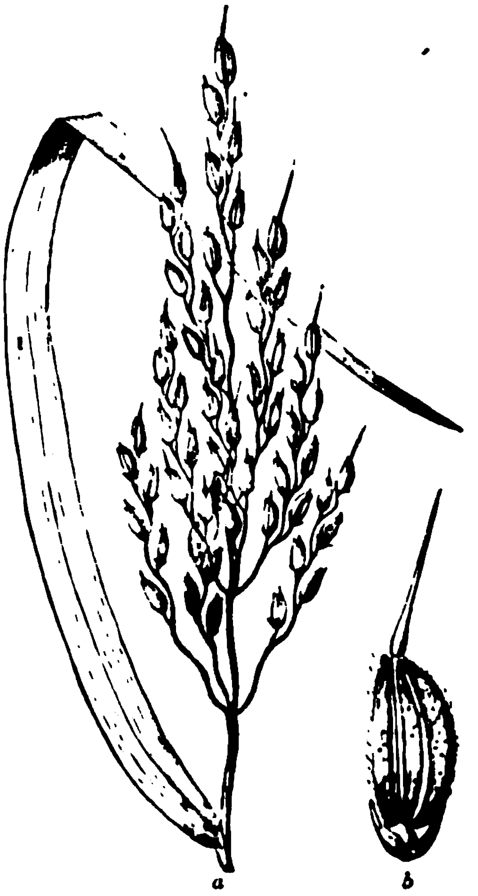
Dr. Roxburgh states that he never saw or heard of an Indian farmer manuring in the smallest degree a rice-field; yet these fields have probably for thousands of years continued to yield annually a large crop of rice, on an average from thirty to sixty fold; even eighty or a hundred has been known. The best rice-fields are extensive open plains through which large rivers pass. The soil is generally of good depth; the best are those annually overflowed by the inundations, from which they necessarily receive some fertilising matter; but the greatest part of the rice lands depend on the rains only, and receive no help except from it and the air. The varieties of rice are innumerable; forty or fifty at least are described. They are divided by Dr. Roxburgh into two kinds; one, called in Telinga, *Poonas*, Sans., *Asoo*, is sown thick in June or July, and transplanted in about forty days, when the plants are about nine to eighteen inches high; the fields are then kept constantly wet; more or less flooded, as some sorts require very little water, while others require a great deal. When the grain is ripe, the water is drained off, and the crop cut down with the sickle: it is either stacked or trod out by cattle. The grain is preserved in pits dug in high ground and lined with the rice straw. The straw is stacked by the careful farmer for feeding his cattle during the hot weather.

The second division of cultivated rice is called *Pedder Worloo* by the Telingas. The grains are awnless, and both the unhusked and husked rice, in most varieties, is white and of excellent quality, though some require much water. In other parts of the country rice is divided, according to the seasons in which it is reaped, into that which ripens in the hot weather of spring, in the summer, or in the winter.

Buchanan states that two crops in the year from the same land do not yield much more than a single good crop would. But the seasons are so uncertain, and the latter crop so liable to fail, that they cultivate as much as possible for the first crop. This is reaped in the rainy season, when the straw cannot be preserved, and as rice-straw is almost the only food which the cattle have in many districts, there is an absolute necessity for sowing the second crop for fodder.

Rice is no doubt the grain which yields food for the largest portion of the human race, but even in India great numbers do not eat rice; in fact in all the north-western provinces wheat is the principal crop, and the natives eat wheaten cakes, and have rather a contempt for rice-eating districts. It abounds however in nourishment, being composed almost entirely of fecula, that is, 96 per cent., and therefore cannot be baked into bread; but it is more easily cooked. It is light and wholesome, and easily digested, and might form a much larger portion of the diet in Europe than it does. Europeans in India eat it at breakfast as well as at other meals, and with fish as frequently as with their curries.

Of the kinds imported into England, the Carolina is the best, and is grown in the marshy grounds of North and South Carolina. The grains are shorter, broader, and boil softer than the Patna rice, which is the best Indian kind known in this country, though in India there are several superior varieties, as for instance the Pilibeet, which are much more esteemed there. In the year 1838, 238,367 cwt. of cleaned and 218,207 cwt. of rough grain were imported into England. The quantity retained for consumption in the United Kingdom, in 1837, was 282,975 cwts.; in 1838, 289,163 cwts., producing a duty in the former year of 25,327*l*., and in 1838, of 24,606*l*. The consumption is in some measure influenced by the price of wheat. The relative values may be judged of by the price of the Carolina rice being 20*s*. when the Patna was 17*s*., Bengal white 13*s*. 6*d*., and the Cargo only 9*s*. 6*d*. The Cargo is a reddish coloured, coarse, but sweetish grain, which is liked by the lower caste of natives of India.



a, panicle of the rice plant, with ripe grains; *b*, a single grain enveloped in its husk and awned.

OSAIBIA, or more properly Ibn* Abi Osaibia, the name commonly given to an eminent Arabic physician, who is called by Nicoll and Pusey (*Catal. Cod. Manuscr. Orient. Biblioth. Bodl.*), Movaffekeddin Abulabbas Ahmed Ben Alcasem Ben Khalifa Ben Junos Ibn Abilcasem Alsaadi Alkhazragi. He was born A.H. 600 (A.D. 1203), and was (as his name implies) of the family of Al-Chazraj, of the tribe of Al-Azd. (Pococke, *Spec. Hist. Arab.*, p. 42, ed. Oxon., 1806.) He informs us himself, in the fourteenth chapter of his work, that he was the pupil of the celebrated Al-Beithar. He studied medicine at Cairo in the lazzaretto founded by Saladin, and was appointed chief physician to the Emir Ezzadin, at Sarchad in Syria, A.H. 635 (A.D. 1238). He died A.H. 668 (A.D. 1269). He is the author of a well-known work entitled 'Oiun al-anba fi thabacat al-athebba' ('Fontes Relationum de Classibus Medicorum'), containing a biographical history of medicine. It is divided into fifteen chapters, of which the first treats of the origin of medicine; the second, of the earliest discoverers in each branch of the profession; the third, of the Greek physicians of the family of Æsculapius (*Asklibious*); the fourth, of the physicians of the school of Hippocrates (Dogmatists); the fifth, of Galen (Galenists) and his contemporaries; the sixth, of the Christian physicians who flourished at Alexandria before the time of Mohammed; the seventh, of Arabian physicians in the time of Mohammed; the eighth, of Syrian physicians under the Abbassides; the ninth, of the translators of the Greek physicians into Arabic; the tenth, of the physicians of Irak and Mesopotamia; the eleventh, of the Persian physicians; the twelfth, of the Indian; the thirteenth, of the Moorish and Spanish; the fourteenth, of the Egyptian; and the fifteenth, of the Syrian. Freind, in his 'History of Physic,' speaks slightingly of this work, but he was acquainted with only a very small portion of it, and was unable to read it in the original language. Reiske, on the contrary (*Opusc. Med. ex Monum. Arab. et Ebraeor.*, 8vo., Halae, 1776), praises it very highly, and gives a tolerably complete analysis of its contents, from which it appears that a great many curious and interesting medical anecdotes and much information relating to the ancient method of practice are to be found in it. It exists at present only in MS. in several libraries of Europe, viz. at Paris, Oxford, and Leyden; but different small portions of it have been published. The life of Bachtishua, translated into Latin by Salomo Negri, is inserted by Freind in his 'History of Physic;' that of Abdallatif was published at Oxford, 1808, 4to., Arab. and Lat., ed. J. Mousley; and a small extract, containing the diploma of a doctor of theology, is to be found in Adler's 'Collect. Nova Nummor. Cuficor.,' 4to., Hafn., 1792, p. 118. There is in the Bodleian at Oxford a MS. Latin translation by Gagnier of the first five chapters. A MS. Latin translation of the whole work by Reiske was left by him at his death, in 1774, to Bernard (probably the same physician who edited several Greek medical treatises); this has never been published, and what has become of it since Bernard's death, in 1793, the writer has not been able to discover. (See Nicoll and Pusey, *loco cit.*; De Rossi, *Dizion. Stor. degli Autori Arabi*; and Reiske, *loco cit.*)

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* As few Arabic names have been more corrupted, it may be useful to mention that it is sometimes spelled Abu, Abou, or Abi [illegible], [illegible], [illegible], [illegible], Osaibia, Osbeia, Osaibe, Osbaia, Osaibea, &c.

OSACCA. [JAPAN.]

OSCI, or O'PICI, a people of antient Italy, who seem to have been identical with the Ausonians, or Aurunci, and who inhabited the southern part of the peninsula. Some critical writers consider the Ausonians to be a branch of the Osci; others, as Polybius, have spoken of them as distinct tribes, but this appears to be an error. The names Opicus and Oscus are undoubtedly the same. Aristotle (*Polit.*, vii. 10) calls the country from the Tiber to the Silarus, Ausonia and Opica; and other antient writers extended the name much farther, to the Straits of Sicily, but the southern extremity of the peninsula appears to have been occupied previously by the Œnotrians, a Pelasgic people, who were conquered by the Lucanians and Bruttii. Cumae, one of the earliest Greek colonies on the coast of Italy, was in the country of the Opici. The early immigrations of the Illyrians or Liburnians along the eastern coast of Italy drove the aboriginal inhabitants from the lowlands into the fastnesses of the central Apennines, from whence they issued under the various names of Umbri, Sabini, and Osci, or Latini Veteres. There was an antient tradition as late as the time of the historian Dionysius, of a sudden irruption of strangers from the opposite coast of the Adriatic, which caused a general commotion and dispersion among the aboriginal tribes. Afterwards came the Hellenic colonies, which occupied the whole sea-coast from Mount Garganus to the extremity of the peninsula, in the first and second centuries of Rome, in consequence of which the population of the southern part of the Italian peninsula became divided into two races, the tribes of aboriginal or Oscan descent, such as the Sabini, Samnites, Lucanians, and Bruttii, who remained in possession of the highlands, and the Greek colonists and their descendants, who occupied the maritime districts, but never gained possession of the upper or Apennine regions. Such is the view taken by Micali and other Italian writers; but Niebuhr (*History of Rome*, vol. i.) describes the Sabini, and their colonies the Samnites, Lucanians, and other tribes which the Roman writers called by the general name of Sabellians, as a people distinct from the Osci or Opici. He says, after Cato and other antient historians, that the Sabini issued out of the highlands of the central Apennines near Amiternum, long before the epoch of the Trojan war, and driving before them the Casci or Prisci Latini, who were an Oscan tribe, settled themselves in the country which has to this day retained the name of Sabina. From thence they sent out numerous colonies, one of which penetrated into the land of the Opicans, and became the Samnite people; and afterwards the Samnites occupied Campania, and, mixing themselves with the earlier Oscan population settled there, and adopted their language. But farther on, speaking of the Sabini and Sabellians, Niebuhr admits the probability of their being originally a branch of the same stock as the Opici or Osci. Micali considers the Sabini, Apulians, Messapians, Campanians, Aurunci, and Volsci, as all branches of the great Oscan family.

The Greeks, being superior to the native tribes in refinement and mental cultivation, affected to despise them, and they applied to the native Italian tribes, including the Romans, the adjunct Opicus, as a word of contumely to denote barbarism both in language and manners (Cato apud Plin., xxix. 1); and the later Roman writers themselves adopted the expression in the same sense: 'Osce loqui' was tantamount to a barbarous mode of speaking. Juvenal (iii. 207) says,

'Et divini Opici rodebant carmina mures;'

and Ausonius uses 'Opicas chartas' to mean rude unpolished compositions. The Oscan language was the parent of the dialects of the native tribes from the Tiber to the extremity of the peninsula, Sabini, Hernici, Marsi, Samnites, Sidicini, Lucanians, and Bruttii, whilst in the regions north of the Tiber the Etruscan predominated. Livy (x. 20) mentions the Oscan as being the language of the Samnites. The older Latin writers, and especially Ennius, have many Oscan words and Oscan terminations. The Oscan language continued to be understood at Rome down to a late period under the empire. [ATELLANAE FABULAE.] In the Social War, the Confederates, who were chiefly people of Oscan descent, stamped Oscan legends on their coins. In Campania and Samnium the Oscan continued to be the vulgar tongue long after the Roman conquest, as appears from several monuments, and especially from the Oscan inscriptions found at Pompeii. (Micali, *Storia degli Antichi Popoli Italiani*, ch. xxix., and *Atlas*, pl. 120; and De Jorio, in his *Plan of Pompeii*, Naples, 1829, pl. 4.)

The Oscan race, like the Etruscan, appears to have been from the remotest times strongly under the influence of religious rites and laws (Festus, under the head 'Oscum'), and the primitive manners and simple morals of the Oscan and Sabine tribes, as well as their bravery in arms, have been extolled by the Roman writers, among others, by Virgil (*Æneid*, vii. 725-730), and Silius Italicus (viii. 525-529).

Concerning the scanty remains of the Oscan language which have come down to us, see 'Linguae Oscae Specimen singulare quod superest Nolae in marmore Musaei Seminarii,' which is given by Passeri, in his 'Picturae Etruscorum in Vasculis,' &c., Rome, 3 vols. fol., 1767-75; and also Guarini, 'In Osca Epigrammata nonnulla Commentarium,' Naples, 8vo., 1830, where several Oscan inscriptions are found collected. For Niebuhr's views on the Opici or Osci, see his 'Roman History,' vol. i.

OSCILLATION and CENTRE OF OSCILLATION. When any system is slightly disturbed from its position of equilibrium, it either falls altogether or endeavours to recover the position which it lost. In the latter case the equilibrium is said to be stable, and in the former unstable. A pendulum hanging downwards is an instance of the stable kind, and the same pendulum, if it could be so nicely adjusted as to rest immediately over the pivot, would be of the unstable kind. But unstable equilibrium is a practical impossibility, since any degree of departure from the proper position would destroy the equilibrium; and those cases in which an apparently unstable position of equilibrium is actually gained, as in a bar resting on two inclined planes, owe the continuance of the equilibrium to the effect of friction. [STABLE AND UNSTABLE.]

When a system endeavours to recover its position, it acquires some velocity in the process; so that, though it would rest at the position of equilibrium if that velocity were then destroyed, it is really urged through the position by the velocity acquired, and continues to depart from it on the other side until, by the forces which act to restore it to the position, all the velocity acquired has been destroyed. Repetitions of the same phenomenon then take place in succession, the body never remaining still when it has attained the position of equilibrium, since it never is in that position except when moving with the velocity acquired in its descent to the position. If then there were neither friction nor resistance of the air to help in destroying this velocity, it would be a universal law of mechanics that a system disturbed from its position of equilibrium would never recover it, but would make perpetual oscillations about it.

In the widest sense, the problem of oscillations includes most of those which occur in astronomy, optics, &c. The moon and planets add to their average motions small oscillations about their mean places: the tides consist of oscillations of the ocean about the uniform spheroid, which, but for the action of the heavenly bodies, would be carried round in the diurnal rotation of the earth; the phenomena of light are produced by the oscillations which take place in an elastic æther; those of sound, by the oscillations of the air; and so on. Usually however the problem of oscillation refers to nothing more than the oscillations of a solid system, acted on by gravity, about a horizontal axis, the original departure from the position of equilibrium being but small; in fact, to the purely theoretical part of the problem of the Pendulum, to which we shall here confine ourselves, giving the investigations in a brief form, since it is impossible, within our limits, to explain the numerous points alluded to with sufficient illustration for a learner.

Let a material point, a very small body, be attached by a string or rod without weight to an immoveable pivot. In the position of rest the string hangs vertically: let us now suppose it removed out of the vertical position, and let go when it makes an angle α with the vertical. When t seconds have elapsed, let it make an angle θ with the vertical. The material point is acted on by gravity with a force which would produce an acceleration g (or 32·1908) feet in one second: if then l be the length of the string, the arc $l\theta$, through which the point must move before it arrives at the lowest point of its course, is diminished with a velocity which is accelerated by $g \sin\theta$ at the time specified, giving, by the well-known equations of motion,

$$\frac{d^2 . l\theta}{dt^2} = -g \sin\theta, \text{ or } l\frac{d^2\theta}{dt^2} + g\sin\theta = 0.$$

The first integration of this gives

$$l\left(\frac{d\theta}{dt}\right)^2 = 2g\,(\cos\theta - \cos\alpha),$$

since it is a condition that the motion began when θ was $=\alpha$. This gives

$$dt = -\sqrt{\frac{l}{g}} \cdot \frac{d\theta'}{\sqrt{(\sin^2\alpha' - \sin^2\theta')}}$$

α' and θ' being the halves of α and θ, and the negative sign being taken because θ' diminishes as t increases. The integration of this is facilitated by assuming $\sin\theta' = \sin\alpha' . \sin\phi$, which gives

$$\sqrt{(\sin^2\alpha' - \sin^2\theta')} = \sin\alpha' \cos\phi,$$

$$d\theta' = \frac{\sin\alpha' \cos\phi . d\phi}{\sqrt{(1 - \sin^2\alpha' . \sin^2\phi)}}$$

$$dt = -\sqrt{\frac{l}{g}} \cdot \frac{d\phi}{\sqrt{(1 - \sin^2\alpha' . \sin^2\phi)}}$$

$$= -\sqrt{\frac{l}{g}} \cdot \left\{1 + \frac{1}{2}P^2 + \frac{1.3}{2.4}P^4 + \frac{1.3.5}{2.4.6}P^6 + \ldots\right\} d\phi$$

where P stands for $\sin\alpha' . \sin\phi$. To find the time of a semi-vibration, this must be integrated from $\theta' = \alpha'$ to $\theta' = 0$, or from $\phi = \frac{1}{2}\pi$ to $\phi = 0$, that is, after change of sign, from $\phi = 0$ to $\phi = \frac{1}{2}\pi$. Now between these limits

$$\int \sin^{2n}\phi . d\phi = \frac{1.3.5 \ldots . 2n-1}{2.4.6 \ldots . 2n} \cdot \frac{\pi}{2}$$

whence, changing the sign of the preceding and integrating each term by this formula, we find the time of a semi-vibration. Double this, to find the time of a vibration, which call T, and we have

$$T = \pi\sqrt{\frac{l}{g}} \cdot \left\{1 + \frac{1}{4}\sin^2\alpha' + \frac{1.9}{4.16}\sin^4\alpha + \frac{1.9.25}{4.16.36} \cdot \sin^6\alpha' + \ldots\right\}$$

very convergent series. If α' be small, we have, with an ror of the second order only,

$$T = \pi\sqrt{\frac{l}{g}};$$

or the time of vibration of the same pendulum in different small arcs is very nearly independent of the lengths of the arcs; a result which might be obtained from the considerations given in the article Isochronism, for the acceleration $g \sin\theta$, θ being small, is very nearly $g\theta$, that is, very nearly as the arc measured from the lowest point. To take in two terms of the series is very nearly equivalent to multiplying the preceding value of T by $1 + \frac{1}{16}\alpha^2$.

The number of vibrations in a mean solar day of the pendulum whose length is l, placed in a vacuum, is

$$\frac{86400\sqrt{g}}{\pi\sqrt{l}}\left\{1 - \frac{1}{16}\alpha^2\right\} \text{ very nearly.}$$

Next, let a number of material points invariably connected together vibrate about a horizontal axis. It is required to find at what distance a single material point must be hung that it may vibrate in the same manner.

Let there be a number of material points, or infinitely small bodies, having the masses m, m', m'', &c., invariably connected with each other, and with an horizontal axis of rotation, their perpendicular distances from the axis being l, l', l'', &c. Let $M = m + m' +$, &c., be the sum of all the masses, and let k be the perpendicular distance of the centre of gravity of the whole from the axis. When the last-mentioned perpendicular distance makes an angle θ with the vertical, the moving force is Mg acting in the direction of gravity at the distance $k \sin\theta$, and acting with a moment of rotation $Mgk \sin\theta$. Let ϕ be the angular velocity at the time in question, which becomes $\phi + d\phi$ at the end of a new interval dt; then taking the mass m for consideration, we have $l\phi$ for its actual velocity, and $l\,d\phi$ for the increment in the time dt, whence $m\,l\,d\phi$ is the actual momentum gained, $m\,l\frac{d\phi}{dt}$ the moving force which would produce that momentum. This force acting at the distance l, and perpendicularly to that distance, would exert a moment of rotation $m\,l^2\frac{d\phi}{dt}$. Ascertain in the same way the moments of rotation of the other masses; then by the equivalence of the impressed and effective forces [Virtual Velocities] we must have—

$$m\,l^2\frac{d\phi}{dt} + m'l'^2\frac{d\phi}{dt} + \ldots \qquad = Mgk\sin\theta.$$

But ϕ is $-\frac{d\theta}{dt}$, thus written since $\frac{d\theta}{dt}$ is negative; if then we denote $m\,l^2 + m'l'^2 + \ldots$ (which is the Moment of Inertia) by $\Sigma m\,l^2$, we readily deduce from the preceding

$$\frac{d^2\theta}{dt^2} + \frac{Mk}{\Sigma m\,l^2} \cdot g\sin\theta = 0.$$

The question of the motion of this system is now completely reduced to that of a simple pendulum; for if we compare the preceding equation with that of the motion of a simple pendulum, we find that the two would agree if the length (there called l) of the simple pendulum were $\Sigma m\,l^2 : Mk$, or;—any rigid system which makes oscillations about an horizontal axis, oscillates in the same manner as a simple pendulum, the length of which is the moment of inertia of the system with respect to its axis divided by the product of the whole mass and the distance of the centre of gravity from the axis. If in the line k or its continuation, a distance equal to $\Sigma m\,l^2 : Mk$ be set off from the axis, the moving extremity is called the centre of oscillation, as being that point in which the whole mass might be collected without any alteration of the law of oscillation.

Let G be the moment of inertia when the axis passes through the centre of gravity and is parallel to the given axis; then [Moment of Inertia] $\Sigma m\,l^2 = G + Mk^2$, whence the distance of the centre of oscillation from the axis is $(G + Mk^2) : Mk$ or $(G : Mk) + k$. Hence the centre of oscillation is always farther from the axis than the centre of gravity by $G : Mk$. Let this be called h: we have then

$$hk = \frac{G}{M}.$$

Now G and M are independent of the position of the axis, G depending only on the masses and manner in which the masses are distributed about the centre of gravity, and M on the amount of the masses. If then a new axis of suspension were taken, distant by h from the centre of gravity on the other side, that is, if a new axis of suspension were taken passing through the first centre of oscilla-

[illegible] and if h' were the distance of the new centre of oscillation from the centre of gravity, we should have

$$h'k = \frac{G}{M}, \text{ but } hk = \frac{G}{M}, \text{ whence } h' = h;$$

that is, the old axis of suspension contains the new centre of oscillation, if the new axis of suspension contains the old centre of oscillation. This is generally expressed thus: the centres of suspension and oscillation are reciprocal. When the body is a continuous mass, the preceding investigations apply, but the integral calculus must be employed to determine G.

OSCULATION, a term used instead of contact by foreign writers. [CONTACT; TANGENT.]

OSCULUM PACIS. [PAX.]

OSIER is the name given to various species of Salix, or willow, employed in basket-making on account of their tough flexible shoots. The following table of the best species, showing the length to which their annual shoots will grow under favourable circumstances, and the purposes to which they are most suitable, is chiefly compiled from Loudon's 'Arboretum Britannicum,' page 1470, to which the reader is referred for full information upon such points.

Names.	Length of annual Shoots.	Use.
Salix purpurea.	3 to 5 feet.	For finer basket-work much esteemed.
Salix Forbyana.	5 to 7 feet.	For finer wicker-work, basket-making, &c.
Salix rubra.	5 to 9 feet.	One of the most valuable for bands, crates, &c.
Salix lanceolata.	5 to 8 feet.	For hampers, crates, and coarser work.
Salix triandra (or French willow).	8 to 9 feet.	Its long tough pliant shoots render it one of the most valuable for white basket-work.
Salix decipiens.	6 to 8 feet.	Often cultivated, but soon wears out, and is of little value.
Salix vitellina (golden osier).	5 to 7 feet.	Very tough, but the rods have too much spray. Much cultivated in osier-grounds.
Salix viminalis (osier withy, and velvet osier).	10 to 12 feet.	Highly esteemed for basket-making and hoops.

The distinctions of these species are mentioned under SALIX.

OSI'RIS, one of the principal Egyptian deities, was the brother of Isis and the father of Orus [ISIS; ORUS], and is said by many writers to have been the first king of Egypt. His history is given in the first book of Diodorus, and in the treatise of Plutarch, 'On Isis and Osiris;' but it is not improbable that the genuine Egyptian traditions respecting this deity had been considerably corrupted at the time of these writers. According to their accounts however, Osiris was the first who reclaimed the Egyptians from a state of barbarism, and taught them agriculture and the various arts and sciences. After he had introduced civilization among his own subjects, he resolved to visit the other nations of the world, and confer on them the same blessing. He accordingly committed the administration of his kingdom to Isis, and gave her Hermes to assist her in council and Hercules to command her troops. Having collected a large army himself, he visited in succession Ethiopia, Arabia, and India, and thence marched through central Asia into Europe, instructing the nations in agriculture and the arts and sciences. He left his son Macedon in Thrace and Macedonia, and committed the cultivation of the land of Attica to Triptolemus. After visiting all parts of the inhabited world, he returned to Egypt, where he was murdered soon after his arrival by his brother Typhon, who cut up his body into twenty-six parts, and divided it among the conspirators who assisted him in the murder of his brother. These parts were soon afterwards, with one exception, discovered by Isis, who enclosed each of them in a statue of wax, made to resemble Osiris, and distributed them through different parts of Egypt. This story appears to allude to the fact mentioned by Herodotus, that Osiris was the origin of the mummy form.*

Both antient and modern writers have differed considerably respecting the peculiar attributes and powers of this deity. Many of the antients believed that he represented the sun or the Nile; while his discovery of the vine and his expedition to India led others to identify him with Dionysus. (Herod., ii. 144.) Herodotus informs us (ii. 42) that the festival of Osiris was celebrated in almost the same manner as that of Dionysus. It appears however not improbable that the worship of Osiris was introduced into Egypt, in common with the arts and sciences, from the Ethiopian Meroe. We learn from Herodotus (ii. 29) that Zeus (Ammon) and Dionysus (Osiris) were the national deities of Meroe; and we are told by Diodorus (iii. 3) that Osiris led a colony from Ethiopia into Egypt.

Osiris was venerated under the form of the sacred bulls Apis and Mnevis (Diod., i. 21); and as it is usual in the Egyptian symbolical language to represent their deities with human forms and with the heads of the animals which were their representatives, we find statues of Osiris represented with the horns of a bull. (*Egyptian Antiquities*, vol. ii., p. 295, 12mo., 1836.)

Osiris, in common with Isis, presided over the world below; and it is not uncommon to find him represented on rolls of papyrus as sitting in judgment on departed spirits. His usual attributes are the high cap, the flail or whip, and the crosier. He is also frequently represented with an artificial beard.

OSMAZOME, a name given by Thénard, and adopted by most chemists, to a spirituous extract of meat; according however to Berzelius it is not a peculiar substance but a mixture of several different bodies, among which are lactic acid and lactates. In the opinion of Berzelius the name ought to be abandoned. According to the experiments of Chevreul however osmazome contains a peculiar substance, to which he has given the name of *creatine* (from κρέας, flesh).

Creatin is solid, inodorous, insipid, colourless, and has a pearly lustre; it does not act upon test papers, and crystallizes in right prisms. Its specific gravity varies from 1·35 to 1·34. When heated it crackles, loses water at 212°, and melts without being discoloured; but on continuing the heat it decomposes, yielding ammonia. At 55° Fahr., 100 parts of water dissolve about 1·2 part; this solution is scarcely at all acted upon by saline or metallic substances. The solution slowly decomposes, exhaling a distinct ammoniacal odour and becoming turbid. Alcohol and most acids also dissolve it.

OSMIUM. This metal was discovered by Mr Smithson Tennant, in the year 1803, in the grains of native platinum [PLATINUM], along with another metal [IRIDIUM]. This compound, called *osmiuret of iridium*, occurs in flat grains and hexagonal crystals. The primary form is a rhomboid. Cleaves perpendicular to the axis. Hardness 4·5 to 5·1, exceeding that of native platinum. Colour iron-grey and pale steel-grey. Lustre metallic. Opaque. Specific gravity 19·5. Insoluble even in aqua regia; becomes black when fused with nitre, and when heated in a tube exhales a peculiar odour.

Berzelius analysed three varieties of osmiuret of iridium, from Siberia, with the annexed results:—

Osmium . .	80	74·9	49·34
Iridium . .	20	25·1	46·77
Rhodium . .	.	.	3·15
Iron . .	.	.	0·74
Palladium . .	.	.	trace.
	100	100·	100·

The separation of osmium from iridium is effected by a tedious process. This metal has the following properties:—it is white, with a bluish grey tint. It may be reduced to leaves. Its specific gravity is 10. It is unalterable in the air at common temperatures, but if strongly heated is oxidized. When it has been exposed to a very high temperature, acids do not dissolve it; but under common circumstances it dissolves completely, though slowly, in nitric acid, and more readily in aqua regia. In both these cases osmic acid is formed.

Protoxide of Osmium.—When potash is added to a solution of chloride of osmium, the protoxide is precipitated in the state of hydrate, and is of so dark a green colour as to appear nearly black. This hydrate dissolves slowly in acids, forming dark green coloured solutions; these do not yield crystals by evaporation, but leave green or greenish-brown translucent residues. When the hydrate is heated rather below redness, it loses water. It detonates when heated with certain combustible bodies.

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* Herodotus says (ii. 86), 'The most [illegible]' [illegible]

It is composed of 1 equivalent of oxygen 8 + 1 equivalent of osmium 100=108.

Sesquioxide of Osmium has not been procured in a separate state, but is obtained in combination with ammonia when the binoxide is heated with excess of this alkali; azote is evolved during the operation by the decomposition of a portion of the binoxide and of the ammonia.

Binoxide of Osmium is formed and precipitated by pouring a solution of carbonate of soda into a saturated solution of bichloride of osmium and potassium. The precipitation takes place gradually, and after separating, by means of hydrochloric acid, a little soda which it retains, it is obtained in a state of purity; it is of a black colour and insoluble in acids. It consists of 2 equivalents of oxygen 16+1 equivalent of osmium 100=116.

Teroxide of Osmium is prepared from the terchloride in the same way as the binoxide from the bichloride. Its existence however is not perfectly established, but is admitted by Berzelius from analogy. If it exist, it of course consists of 3 equivalents of oxygen 24 + 1 equivalent of osmium 100=124.

Peroxide of Osmium, or *Osmic Acid*.—This is a very curious compound, differing remarkably from all the preceding substances. It is obtained whenever osmium is burnt in the air or in oxygen gas, or when the metal is heated with hot nitric acid. It is white, very volatile, extremely fusible, soluble in water, and crystallizable. It possesses an extremely disagreeable odour, somewhat resembling that of chlorine. This property suggested the name of the metal (ὀσμῆ, *odor*). It has no acid reaction, except that of combining with alkalis, forming compounds which are called osmiates. When sulphurous acid is added to a solution of osmic acid, it is rendered yellow, orange, brown, green, and blue, dependent upon the extent to which the deoxidizement is carried on. It stains the skin, is acid and poisonous. It is composed of 4 equivalents of oxygen 32+1 equivalent of osmium 100=132.

Chlorine and osmium, according to Berzelius, combine in four different proportions, and sulphur and osmium also unite to form several sulphurets. This very peculiar metal also forms alloys with some others, but these compounds are not of sufficient importance to require a description.

OSNABRÜCK (generally written *Osnaburg* in English) is a province of the kingdom of Hanover. It is divided into the following parts:—The principality of Osnabrück, 903½ square miles; the lower county of Lingen, 126½ square miles; the circles of Meppen and Emsbuhren, 693 square miles; and the county of Bentheim, 399 square miles: the area of the whole is 2122 square miles, and the population 227,000. The whole country is a part of the plain of northern Germany, but is traversed in the south by two chains of hills; within and to the south of these hills there is good arable land, but as soon as you leave their vicinity everything is changed. Immense heaths, moors, morasses, and sandy deserts alternate with vast levels; except near the rivers, the soil is poor and the vegetation scanty. This province contains the Hümling, an extensive uninterrupted sandy desert, which is 25 miles in circumference, where the wind raises columns of sand as in the deserts of Africa, and which is entirely surrounded by vast and impenetrable morasses: it is beyond comparison the most dismal tract in all Germany. The largest river is the Ems, which waters only the western part, and becomes navigable after being joined by the Hase, the second principal river; all the other streams are mere rivulets or brooks. In the south there are many good springs; in the north they are fewer and have more or less a marshy taste. The climate is temperate, but the horizon is generally overcast and cloudy. Fetid exhalations often arise from the marshes, but do not seem to be injurious to health, for human life is as long here as elsewhere, and the cattle are remarkable for their size and beauty. Agriculture is not in a flourishing state, and the country does not produce sufficient corn for its own consumption. Hemp and flax are grown in considerable quantities. There is only one principal manufacture, that of linens, which is carried on to a very great extent, especially in the principality of Osnabrück and in Lingen. Though considered as an occasional occupation, it is often more profitable than agriculture. The value of the coarse linens (called Osnaburgs) annually exported is 200,000 dollars. The thread is all spun in the country. In the circle of Meppen, which is the poorest part of the country, and is unable to support the scanty population, who are a very industrious and temperate people, vast quantities of woollen stockings are knit and exported to Holland. They also derive some profit from the breeding of horned cattle, sheep, and bees. They export also a good deal of turf and peat. The greater part of the men of Meppen (5000 or 6000 perhaps) go in summer to find work in Holland, from which they annually bring back 18,000 or 20,000 pounds sterling. There are some woollen, leather, and snuff and tobacco manufactories in the large towns, and shipbuilding is carried on at Papenburg, where above sixty ships are annually built.

Osnabrück was formerly a bishopric and of very great antiquity, being the first that was founded in Saxony by Charlemagne. The first bishop was Wido, a Frieslander. After the Reformation the inhabitants embraced the Lutheran faith, and it was decided by the treaty of Westphalia that it should be governed alternately by a Roman Catholic and a Protestant bishop, the latter to be always a prince of the house of Brunswick-Lüneburg. As the Catholic bishop was generally an old canon and the Protestants always chose a young prince, the country remained for a long time under the electoral house of Brunswick: the last bishop of that house was the late Duke of York. In the year 1802 the country was made over to Hanover as an hereditary temporal principality, in consideration of certain territorial cessions. It was afterwards annexed first to the kingdom of Westphalia and then to the French empire, and was recovered by its antient sovereign on the fall of Napoleon.

Osnabrück, the capital, is situated in 52° 16′ N. lat. and 8° 1′ E. long., in a valley on the river Hase. It is surrounded with a wall and ditch, and has five gates. Like most of the old German towns, it is irregularly built. It is the seat of the provincial government and chancery, the residence of a Roman Catholic vicar-general and chapter, and of a Lutheran consistory. The most remarkable public buildings are, the palace, built in 1665, the cathedral, the Roman Catholic church of St. John, the Lutheran churches of St. Mary and St. Catherine, and the fine town-hall, in which the treaty of Westphalia was concluded at the same time as at Münster. There are a Catholic and a Lutheran gymnasium, a Lutheran and 2 Roman Catholic orphan-houses, a seminary for schoolmasters, 3 hospitals, several elementary schools, and a Bible Society. The inhabitants, amounting to 11,000, have manufactures of coarse woollens, leather, linen, and tobacco. The linen manufactured in the adjacent country is brought here to be measured and stamped. There are several bleaching-grounds, a paper-mill, a chicory coffee manufactory, &c.

(Hassel; Stein; Stüve, *Beschr. des Fürstenthums Osnabrück*; J. Möser, *Osnabr. Geschichte*; Reinhold, *Das Bisthum Osnabrück*.)

OSPREY. [Bald Buzzard.]

OSROE'NE. [Mesopotamia.]

OSSA, MOUNT. [Thessaly.]

OSSOLA. [Novara, Valli di.]

OSSEOUS BRECCIA. A considerable number of the bones of mammalia discovered by geological researches have been found in clefts of limestone rocks, wholly or partially filled by a mingled mass of calcareous fragments and portions of bones, more or less perfectly cemented by carbonate of lime often in a crystallized state. This bony breccia abounds in the clefts of the limestone rocks of Gibraltar, Nice, and other parts of the Mediterranean shores; and in Cuvier's magnificent work 'Ossemens Fossiles' a large number of interesting quadrupeds and some birds are stated to have been obtained from them.

OSSIAN'S POEMS. In the article Macpherson the circumstances connected with the publication of these poems, and of others which preceded them, are briefly mentioned. Macpherson affirmed that they were translations made by himself from antient Erse manuscripts, which he had collected in the Highlands of Scotland, and which were the genuine compositions of Ossian, a Highland poet, who lived about the middle of the third century, and whose poetical works had been transmitted orally from bard to bard and from age to age, till the introduction of the art of writing into the Highlands afforded the means of fixing them in those manuscripts from which the translations were made.

The truth of this statement was denied by Dr. Johnson, who boldly pronounced the whole of the poems ascribed to Ossian to be forgeries, and defied Macpherson to produce a manuscript of any Erse poem of earlier date than the sixteenth century. Hume, Gibbon, and others, though they did not express so decided an opinion, seemed to more than doubt their authenticity. On the other side, Dr. Blair defended them in an elaborate 'Critical Dissertation;' Dr. Henry, in his 'History of Great Britain,' founded many of his statements relating to the early condition and manners of the inhabitants of the northern part of the island exclusively upon their authority; Lord Kames, in his 'Sketches of Man,' appealed to them as substantiating his theories; Cesarotti prefixed to his Italian translation, which improved their beauties and softened their defects, a dissertation in which he speaks of Ossian as equal if not superior to Homer; Arthur Young lent his aid on the same side; and the whole body of the Highlanders seemed ready to do battle in the cause of the Gaelic bard.

In the year 1800, Malcolm Laing added to the 2nd volume of the first edition of his 'History of Scotland' a dissertation in which he endeavoured to establish, from historical and internal evidence, that the 'Poems of Ossian' were, without a single exception, entirely spurious.

The Highland Society at Edinburgh, in 1797, appointed a Committee to inquire into the authenticity of the 'Poems of Ossian.' A list of queries was sent to every person who was likely to afford information on the subject, antient Erse and Irish manuscripts were assiduously sought after, and all the traditions existing in the Highlands which had any relation to the subjects of the poems were carefully collected. In 1805, when the Committee had completed their labours, they published their Report, with the name of Henry Mackenzie annexed to it as their chairman. The Report states, that 'the Committee had not been able to obtain any one poem the same in title and tenor with the Poems of Ossian.' About the same time was published a splendid edition of 'The Poems of Ossian, &c., containing the Poetical Works of James Macpherson, Esq., in Prose and Rhyme; with Notes and Illustrations by Malcolm Laing.' The object of these notes and illustrations was to destroy the authority and depreciate the value of the text.

The research, the acuteness, and the close reasoning of Laing both in his dissertation and in the notes to his edition of the poems, together with the admissions made in the Report of the Highland Society, appeared to have nearly decided the question against Macpherson. The controversy however, as far at least as relates to the historical authority of the poems, can hardly be said to be terminated. In 'The Highlanders of Scotland, their Origin, History, and Antiquities,' by W. Skene, a work published in 1837 at the request of the Highland Society of London, we are informed, that 'by a fate altogether singular in the case of the Highlanders, a complete body of those antient versified histories have been handed down in the Poems of Ossian' (vol. i., p. [illegible]); and that 'the value of Ossian as an historical poet, must stand in the highest rank, while, whether the first part of these poems are of antient or of modern composition, there can remain little doubt that in him we possess the oldest record of the history of a very remote age' (vol. i., p. 212).

Having thus given a short detail of the nature, progress, and present state of the controversy relating to these poems, we shall now offer, as briefly as we can, first, what appear to us to be the most important facts and arguments which bear upon their authenticity; and, secondly, our own estimate of their poetical value.

Of the languages spoken by the Gaelic nations who inhabited the western parts of Europe in the time of Julius Cæsar, the Irish is probably that which has suffered least by mixture with others. The Erse, spoken in the Highlands of Scotland, approximates so closely to the Irish, that it may be considered rather as a dialect of it than a distinct language. But while the Irish has been a written language from an era probably anterior to the Christian, with an antient alphabet, and a series, not only of bards, but of historical annalists, of whose works there are manuscripts still extant of as early a date as the eleventh century, there is no evidence that the Erse was ever written previous to the fifteenth or sixteenth century. If then these poems were composed by Ossian, in Erse, at the end of the fourth century, they must have been preserved by tradition for thirteen or fourteen hundred years. The Irish, with all the advantage of writing to fix it, has suffered so much alteration, that the oldest manuscripts are understood with difficulty even by those who are most learned in the language, and some are quite unintelligible. We have therefore a right to infer that the Erse, unwritten, and spoken by a people at least as rude as the Irish, has undergone a similar change; and that these poems, if preserved in the words in which they were composed by their supposed author, could not be understood by the present race of Highlanders.

Macpherson published the Erse of the seventh book of 'Temora,' but it was printed from a copy in his own handwriting, and the original has never been produced. Macpherson of Strathmashie, a poet who assisted, as he affirms, in transcribing the poems from old manuscripts or from oral tradition, said that one of these old manuscripts was dated in 1410; and Lord Kames, in his 'Sketches of Man,' asserts, that the four first books of 'Fingal' were obtained from a Gaelic manuscript, written on vellum in 1403, and found by the translator in the Isle of Skye. No doubt Macpherson told him so, but he does not say that he saw the manuscript, nor has it ever been produced. Indeed the oldest Scotch MS. extant, a copy of Winton's Chronicle, in the Royal Library, Edinburgh, is not of an earlier date than 1420. As to the Erse manuscripts, frequent appeals were made by Macpherson's friends to the 'Red Book' of the bard of the Clanronald family, which was in Macpherson's possession, and was said to contain 'some of the poems which are now translated and published.' It was obtained from him, but not till he was actually threatened with a prosecution by the Clanronald family, and was found to be a small 12mo. of one hundred and fifty leaves, written in the Irish character, and dated September 8, 1720, in the midst of the songs. It was found to contain only one poem which had any relation to Ossian, a short ballad on the longevity of the Fions. Another appeal was made to 'a large folio MS.' called the 'Red Rhymer,' which was stated to have been given 'by Mr. Macdonald of Glenalladale in Muidart, to Mr. Macdonald of Kyles in Cnoideart, who gave it to Mr. Macpherson. It contains a variety of subjects, such as some of Ossian's poems, Highland tales, &c.' Laing applied to Mr. Mackenzie, the gentleman to whom Macpherson bequeathed his MSS. and the publication of his Erse 'Ossian' (mentioned below), for the production of this MS. We give the result of this application in Laing's own words: 'In consequence of this requisition, sixteen manuscript volumes, in quarto and octavo, were transmitted to Edinburgh; but the "Red Rhymer" in folio, the only remaining MS. ever specified or appealed to for the originals of Ossian, was not produced. The MSS. consisted of medical and religious treatises, Irish legends and legendary histories, an obituary, a vocabulary, genealogies, &c., with many of the Irish ballads ascribed to Ossian, but not a single original, as far as could be discovered, of Macpherson's pretended translation of Ossian.'

A subscription of 1000*l.* was raised by Macpherson's countrymen in the East Indies to defray the expense of publishing the supposed Erse originals. It was placed in Macpherson's hands, and he retained it till his death, when he left it to be applied to the purpose for which it was raised. In 1807 appeared 'The Poems of Ossian, in the original Gaelic, &c.; with Notes and Observations, by John M'Arthur.' London, 3 vols. 8vo. This edition was accompanied by a literal Latin translation, by Robert Macpherson, and preceded by a dissertation on the authenticity of the poems by Sir John Sinclair. Still there were no antient manuscripts; the 'original Gaelic' was printed entirely from Macpherson's hand-writing, and corresponded literally with the English, which, there is no doubt, was translated into Gaelic by Macpherson himself. He had abundance of time for this task before he died, and is known to have been well qualified for it, Erse, not English, being his native language.

The truth is, that not a manuscript, nor a fragment of a manuscript, of any antient poem, Erse or Irish, which Macpherson has translated in his 'Ossian,' has ever been discovered. Ballads indeed there are, some in Erse, but many more in Irish, in which the Ossianic heroes are celebrated; there is a large manuscript collection of them in the Dublin University Library, several of which were published by Miss Brooke in 1789 with an English poetical version; and there are traditions, not only in Ireland, but also in Scotland, especially in Argyleshire and other districts of the West Highlands, relating to Fingal, Ossian, &c. Some of these ballads and traditions have supplied circumstances, or names, or incidental allusions, which have been worked up into the Ossianic collection; so that the Highland reader was continually reminded of something which was familiar to his imagination, and having found parts which he thought he knew, was ready to claim the whole. These materials have been carefully compared, both by Laing and the Highland Society, with the poems, and the use which has been made of them in each instance specifically pointed out.

According to 'Ossian's Poems,' Fingal was king of Morven, which may be supposed to represent Argyleshire and the adjoining parts of the West Highlands; here he had his palace of Selma (a name never heard of before the publication of 'Ossian's Poems'), and here his father Comhal, his grandfather Trathal, and his great-grandfather Trenmor reigned. Ossian was the son of Fingal, and Oscar the son of Ossian. For this kingdom and its kings there is absolutely no foundation in the annals of the Highlands or of the Highland clans; in some Erse ballads however and Highland traditions Fingal and Ossian are occasionally spoken of as Highland heroes, but in others they are mentioned as Irish. On the contrary, the Irish annalists and the Irish bards are uniform and consistent and distinct in their notices of them. According to the Irish annalists, Fingal, son-in-law of Cormac, king of Leinster, was commander of the Fianna Eirinn, or Fians, a military race who existed at this time in Ireland. Fingal's palace was at Almhuin, or Allen, in Leinster, and he died in the year 273. In the reign of Cairbar, the son and successor of Cormac, this military class, or militia as they have been called, were put down by force in consequence of their dangerous presumption and the dissentions among their own body. 'They were attacked,' says Moore (*History of Ireland*, vol. i.), 'by the united force of almost all the royal troops of the kingdom (the king of Munster alone taking part with the rebellious Fians), and a battle, memorable for its extent of carnage, ensued, in which Osgar, the son of Oisin, or Ossian, was slain by the monarch's own hand.' This was the battle of Gabhra, which forms the groundwork of the poem of 'Temora.'

At this time, and for some centuries afterwards, the name of Scotia was exclusively applied to Ireland, and the name of Scoti, or Scots, to the inhabitants. They were a warlike race, who had conquered the greater part of Ireland, and gradually imposed their name on the island and its inhabitants. One of this race, Cairbar Riada, in the year 258, led over a colony of the Scoti from Ireland, and established them in Argyleshire. Riada had a territory in Ireland named Dalriada, and the district obtained by his colony was called Dalriada also. They had great difficulty however in maintaining their station against the power of their opponents the Picts, and it is uncertain whether they were not driven back to Ireland. But in the year 503 a larger colony was led over by Fergus MacErth, who established the kingdom of Dalriada, which afterwards obtained possession of the whole of the northern part of Britain, and imposed the name of Scoti on the inhabitants, and of Scotland on the country, as had previously been done in Ireland. Thus the Highlanders became connected with the Scots of Ireland, and through them derived their traditions of Fingal and Ossian.

It is not worth while to enter into evidences of forgery afforded by single circumstances and minor details in the various poems. Such evidences are in fact diffused through the whole of them, and meet us at every step, either in sentiments inconsistent with the rude state of society at the time, in the omission of every allusion to the dwellings, the dresses, the means of subsistence, and the superstitions of the inhabitants, as well as all mention, even incidentally, of animals which are known to have been in the country at the time. Such omissions could hardly have been made by a poet who was familiar with the manners and objects of that age, and was himself a party in the events which he describes.

To show the modern materials and workmanship of the poems, Laing has pointed out, in numerous passages, imitations of the Bible, and of Homer, Virgil, Milton, and others. Many of these imitations are obvious enough, but others are mere casual resemblances of phrases and words, which a genuine translator might have easily fallen into in rendering a real original.

The substance of Dr. Blair's 'Critical Dissertation on the Poems of Ossian' was originally delivered, soon after the first publication of 'Fingal,' in the course of his lectures as professor of rhetoric and belles-lettres in the university of Edinburgh. This Critical Dissertation, an elaborate composition of nearly pure nonsense, which expresses unbounded confidence in the genuineness of the poems, and bestows the most extravagant encomiums upon them as equal and in some respects superior to Homer, added to the natural astonishment that such poems should have been produced by a Gaelic bard in the third century, extended their fame not only throughout Great Britain, but over the whole continent of Europe; and France, Germany, and Italy vied with each other in enthusiastic admiration of them. This fever has in a great measure subsided, but Ossian has still his admirers, and the Dissertation, no doubt, its readers. To us it appears that almost everything which gives intrinsic value to other poems is wanting in these. We read them with almost uninterrupted incredulity. The characters represent a race of men which it is an absurdity to suppose ever to have existed. The events and incidents, so far as they are intelligible and there is anything approaching to detail, are such as we cannot even imagine to have occurred at any time or under any circumstances. All good poetry is distinguished by the truth and distinctness of its representations; and it has always been remarked of the greatest poets that they must have looked upon external nature and watched the workings of the human mind with the greatest diligence; and this appearance of truth is preserved not only in such poetry as represents the actual appearances of nature and the ordinary events of human life, but even in that more elevated poetry which passes beyond the bounds of reality. In Homer, with whom Ossian has been so absurdly compared, the scenes are perfectly panoramic; we never imagine that we are looking at a picture; the objects themselves are before our eyes; we are present at the events; the persons are known to us, with all their peculiarities, and we can trace their motives of action; when they express themselves in such or such a way, we can tell what passion it was that moved them, or what specific object they had in view. There is nothing of this kind in Ossian. Everything is vague and indistinct; the scenes are all confused; and the images, undefined as they are, seem to recur continually. Hence nothing is impressed upon the mind; nothing fixes itself upon the memory. There is no discrimination of character. We are informed indeed that some are old and some are young, some are generous and some cruel, but even these broad personal distinctions we should hardly have discovered from any peculiarity in their thoughts or manner of speaking. Every one expresses himself in nearly the same way, and a wearisome repetition of affected sentimentality pervades the whole.

Without something however of the substance of poetry, so high a reputation as these poems once had could hardly have been obtained. Macpherson was a Highlander, and had lived among mountain scenery from his infancy; and though many of his pictures, even of that scenery, are false, still there are sketches interspersed throughout all the poems which are true and beautiful.

But the great charm of Ossian's poems is in the language. A rich stream of harmony flows through all of them, which many are sensible of who are quite incapable of judging of the truth of the representations or the propriety of the thoughts. Sir Walter Scott, in a letter to Anna Seward, says, 'Most Highlanders, after they have become complete masters of English, continue to think in their own language; and it is to me demonstrable that Macpherson thought almost every word of Ossian in Gaelic, although he wrote it down in English. This gave a great advantage to him in forming the style of Ossian, which, though exalted and modified according to Macpherson's own ideas of modern taste, is in great part cut upon the model of the tales of the sennachies and bards.' M'Culloch, in his 'Letters from the Highlands,' addressed to Sir Walter Scott, expresses an opinion somewhat different, and remarks, that the original poems were in verse, and that a great part of their beauty must have been lost in a prose translation. If he had examined that prose with attention, he would have found a most careful rhythmical elaboration of refined English, with which the rude versification of any poem ballads which exist either in Irish or Erse would not bear a comparison. Indeed as a specimen of rhythmical prose we have nothing equal to the Ossianic poems in our language. Every part is, in this respect, worked up with extreme care; there are whole lines following consecutively of measure nearly pure, but generally intermixed with other measures in such a manner as to produce an effect extremely pleasing. The sentences also are very short, which affords the means of adjusting the pauses so as to conceal the obviously versified structure which the lines would have otherwise assumed; and to add to the attraction of this 'measured prose,' poetical epithets and phrases, drawn from poets ancient and modern, are scattered lavishly over the whole.

OSSIFICATION is the formation of bone. The natural process is already considered in the article BONE, and that by which injuries are healed in the article FRACTURE. Preternatural ossification is observed in several tissues of the body. It is most frequent in the cartilages of the ribs, in which it almost constantly occurs in advancing years. In most persons bone begins to form in these parts after the fiftieth year; it sometimes commences between the ages of thirty and forty, but is often delayed to a much later period; and Harvey relates that in the body of Thomas Parr, who died in his 153rd year, the cartilages of the ribs were still flexible and soft. The change is generally earlier in men than in women, and it affects the cartilage of the first rib sooner than the rest.

Next to the cartilages of the ribs those of the windpipe are most liable to become osseous. Ossification of the cartilages of the ear, nose, and Eustachian tube is, on the contrary, extremely rare, and in the few cases in which it occurs it is not particularly connected with old age. The cartilages of the moveable joints never ossify.

The tendinous tissue is that which, next to the cartilaginous, is most subject to ossification. This change is not uncommon at the insertion of the tendons of muscles that are much exerted, and in the ligament of some fixed or slightly moveable joints. Small pieces of bone are also not unfrequently formed in the dura mater [BRAIN]; and these are one of the sources of incurable epilepsy. Bone is also sometimes formed in the fibrous coats of the spleen and liver.

Ossification occasionally takes place in the false membranes produced by acute inflammation of the pleura, and more rarely in those of the pericardium; and it is a common process in the adhesions which form between the heads of bones exposed by ulceration of their cartilages, producing the most fixed kind of anchylosis of the joints.

A few remarkable cases are recorded of ossification of the muscles. There is a skeleton in the museum of the College of Surgeons in London, in which it has taken place to such an extent that nearly all the bones must have been immoveably fixed by the transformation of the tissues by which, in the healthy state, they are moved. In equally rare cases the crystalline lens, the vitreous humour [EYE], and some other parts, are found converted into bone.

In all these examples the material formed exactly resembles true bone in its minute structure and chemical composition. In other cases, as in ossification of the heart and arteries, the substance deposited is composed of carbonate and phosphate of lime, as bone is, but its particles have no definite arrangement. That which is called ossification of the heart is not an affection of the proper substance of that organ, but of its valves, in which earthy matter is sometimes deposited, so as to render them stiff and unyielding, and destroy the pliancy which is necessary for the performance of their functions. A deposition of earthy matter in any part of the substance of the heart itself is among the rarest diseases, but such cases are on record. [HEART, DISEASES OF.]

The disease named ossification of the arteries consists in the deposition of plates or rings of hard earthy substance in their middle elastic coats. This deposition is preceded by that of a peculiar soft opaque yellow substance, which becomes gradually hardened. The deposition of this yellow substance in the large arteries is so common that it is very rare to meet with the body of an adult in whom it has not taken place to a greater or less extent; and it not unfrequently commences in early childhood. The change to earthy matter does not commonly take place before the thirtieth year, and is very general after the sixtieth. The stiffness and irregularity which it produces in the large arteries, the ulceration of their lining membrane which often accompanies it, and the dilatation consequent on their loss of elasticity, are common causes of dyspnœa and dropsy. The same changes are frequent in the arteries of the legs, and the obstruction to the circulation which they produce generally gives rise, if life is sufficiently prolonged, to the affection called gangræna senilis. [ARTERIES, DISEASES OF.]

OSSORY, an Irish bishopric, included in the ecclesiastical province of Dublin. The diocese is bounded on the north by that of Kildare, on the north-east and east by that of Leighlin, on the south-east by that of Ferns, on the south by that of Waterford, on the south-west by that of Lismore, on the west by that of Cashel, and on the north-west by that of Killaloe. A small portion of the diocese is detached from the main part, and is surrounded on the north by the bishopric of Meath, and on all other sides by that of Killaloe. The extreme length of the diocese of Ossory from north to south is given by Dr. Beaufort (*Memoir of a Map of Ireland*) and by the Ecclesiastical Commission (*Parl. Papers* for 1837, vol. xxi.) at 36 Irish or 46 English miles; the breadth at 23 Irish or 29 English miles; and the area, by Dr. Beaufort, at 346,000 Irish or 555,000 English acres. By taking the length in the direction from north-north-west to south-south-east the length is 49 Irish or 61 or 62 English miles, and the breadth 17 Irish or 22 English miles. The diocese comprehends nearly the whole county of Kilkenny, a good part of Queen's County, and a small portion of King's County. It takes its name from a district, not from a town.

The bishopric was founded early in the fifth century, and was established in the first instance at Saigur, now Seikyran or St. Kyran, a parish which forms the detached part of the diocese mentioned above. It was afterwards removed (A.D. 1052) to Aghaboe or Aghavoe, in the barony of Upper Ossory in Queen's County, and finally (near the close of the twelfth century) to the borough of Irishtown, which forms part of the city of Kilkenny. The cathedral, dedicated to St. Canice, is a large and handsome pile, built in the twelfth and thirteenth centuries. It is in the form of a cross, chiefly of early English architecture, with a low massive tower at the intersection of the nave and transepts. [KILKENNY, CITY OF.] The cathedral establishment comprehends a dean, precentor, chancellor, treasurer, and archdeacon, seven prebendaries, and three vicars choral. The bishop has a good house close to the cathedral.

The gross yearly income of the bishopric, on the average of three years ending 1831, was 3859*l.* 0*s.* 6¾*d.*, the net income for the same period 3322*l.* 11*s.* 0¼*d.* The lands belonging to the see comprise 21,730 statute acres of profitable land. The bishop presents to the dignities and prebends in the cathedral, and to twenty-two other benefices.

The number of parishes in the diocese was given by Dr. Beaufort (A.D. 1792) at 136; the number of benefices at 56; of churches at 36; and of glebe-houses 12. By the Fourth Report of the Ecclesiastical Commissioners (*Parl. Papers* for 1837, vol. xxi.) the number of parishes was given at 128, the number of benefices at 59; 32 of them single parishes and 27 unions. Of the 59 benefices, only 46 had churches; there were three chapels-of-ease; making 49 places of worship of the establishment, capable of accommodating 9170 persons. The population of the diocese in 1834 was estimated by the Commissioners of Public Instruction at 222,325; viz. 12,361 members of the established church, 209,848 Catholics, 8 Presbyterians, and 108 other Protestant dissenters. The number of places of worship by the First Report of the Commissioners (*Parl. Papers* for 1835, vol. xxxiii.) was 55 for the establishment (of which 52 were churches), 94 for Catholics, and 4 for Protestant dissenters. The Presbyterians had no meeting-house in the diocese. The number of benefices as well as of churches slightly varies in this Report from that quoted above. The proportion of the members of the establishment to the whole population was little more than half the average proportion in the whole of Ireland; that of the Catholics materially above the average; that of Presbyterians and other Protestant dissenters very much below the average.

The number of day-schools in the diocese, according to the Second Report of the Commissioners of Public Instruction (*Parl. Papers* for 1835, vol. xxxiv.) was 308; of which 229 were wholly supported by payments from the parents of the children, and 68 wholly or in part by endowment or subscription; 18 of these were in connection with the National Board of Education. The total number of children at school was computed at 20,976; of 18,868 children contained in the schools from which returns were made, 11,449 were boys, 7196 girls, and of 221 the sex was not specified. The computed proportion of children at school to the total population was 9·44 per cent., being considerably above the average of Ireland.

This see has been united, by virtue of the Act 3 & 4 Will. IV., to the adjacent sees of Leighlin and Ferns.

OSTADE, ADRIAN VAN, was born in 1610, in the city of Lübeck; but though a German by birth, he is always considered to belong to the Dutch school, having formed his style in Holland, where he studied under Frank Hals, and is said to have received some instruction from Rembrandt. In the school of Frank Hals he formed an acquaintance with Brouwer, who became his intimate friend and adviser. Like Brouwer, he chose his subjects from low life, such as farm-houses, stables, and the interior of alehouses; the figures are generally occupied in drinking, smoking, and the like; rural sports, village weddings, and countrywomen engaged in their domestic employments, were the scenes and the characters with which he was familiar. But though in the choice of his subjects he had no regard to elegance, and though he took what he had before him, without endeavouring to improve it, his compositions are so spirited, there is such truth, nature, and life in his little pictures, there is such delicacy in his pencil, such warmth, transparency, and brilliancy in his colouring, and such a profound knowledge of the chiaroscuro, that it is impossible not to admire his genius and execution. The following is the character given of him by Fuseli:—

'Adrian van Ostade, more properly than any other Dutch, Flemish, or German artist, may be said to have raised flowers from a dunghill. He has contented himself to trace the line which just discriminates the animal from the brute, and stamps his actors with instinct rather than with passions. He has personified the dregs of vulgarity, without recommending them by the most evanescent feature of taste, and yet decoys our curiosity to dive with him into the habitation of filth, beguiles our eye to dwell on the loathsome inmates and contents, and surprises our judgment into implicit admiration, by a truth of character, an energy of effect, a breadth and geniality of touch and finish, which leave no room for censure. If he is less silvery, less airy than Teniers, he is far more vigorous and gleaming; if his forms be more squat and brutal, they are less fantastic and more natural; if he groups with less amenity, he far excels the Fleming in depth and real composition.'

Ostade's figures were so much admired, that he was frequently solicited by the most eminent contemporary artists to paint the figures in their landscapes. His best works are extremely scarce and sell at very high prices. Dr. Waagen, in his valuable work 'On Art and Artists in England,' describes several of Ostade's works in the collections of Sir Robert Peel, Lord Ashburton, Mr. Hope, his late Majesty George IV., Mr. Beckford, and in the Bridgewater and Dulwich galleries. Ostade died in 1685, at the age of 75.

OSTADE, ISAAC VAN, born at Lübeck in 1617, was the brother of Adrian, from whom he learned the art of painting, and whose manner he imitated so closely that some of his copies after Adrian have been frequently ascribed to the latter. He died young, which hindered him from acquiring the excellence that he would probably have attained. He is generally characterised as much inferior to his brother, but Dr. Waagen, after carefully examining his pictures in the collections in England, says of him:—'Great injustice is done to Isaac van Ostade by the poor pictures of country life which are frequently ascribed to him in the galleries in Germany. In Holland, in Paris, and above all in England, we may be convinced that in his village scenes and in his winter-pieces he is a wholly original master, and by no means inferior to his brother.' The Doctor then proceeds to describe in terms of unqualified admiration a picture by Isaac (1 foot 9 inches high and 1 foot 6 inches wide) in the collection of Sir Robert Peel, who paid 400 guineas (not 4000, as it stands both in the German and the English, through a typographical error) for it—a price which the Doctor thinks reasonable in comparison with others. Dr. Waagen describes other capital pictures by Isaac van Ostade at Lord Ashburton's, in the Bridgewater Gallery, and in the private collection of George IV.

OSTEND (properly written *Oostende*), a fortified town seaport of West Flanders, in 51° 14′ N. lat. and 2° 54′ E. long., 12 miles west from Bruges and 25 miles east-north-east from Dunkirk. The town is clean and well-built. In 1834 it contained 1403 houses, 57 streets, and 5 squares, 3 churches, 6 schools, a prison, an hospital, and a town-hall, which is a large and plain but handsome building; the population is 11,390. The town stands upon a plain, and is entered by four gates. Of late years it has been much frequented during the summer as a watering place; the sea-bathing is good, and there are excellent baths. The ramparts form an agreeable promenade.

Ostend has great facilities for carrying on trade with the interior by means of canals. The Ostend and Bruges canal is of sufficient dimensions to allow the largest Indiamen to pass through it. The Nieuport canal terminates at Ostend; and by the canal from Bruges to Ghent, which is a continuation of the cutting from Ostend to Bruges, and which communicates with the Schelde, Ostend is connected with the heart of the kingdom of Belgium. This town has recently been rendered of more importance by the system of railroads established in Belgium, by which it is intimately connected with Bruges, Ghent, Courtray, Termonde, Malines, Brussels, Antwerp, Louvain, Tirlemont, and Liége. By means of these works passengers landing at Ostend may reach Liége in six or seven hours. The communication with England is kept up by steam-vessels, which leave London and return twice in every week, performing the voyage in about 14 hours.

The number of vessels that arrived and cleared from the port in each of the years from 1833 to 1836, was as follows:—

	Inwards.				Outwards.			
	Loaded.		In Ballast.		Loaded.		In Ballast.	
	Ships.	Tons.	Ships.	Tons.	Ships.	Tons.	Ships.	Tons
1833	865	90,845	16	1,732	670	61,129	365	42,428
1834	519	54,183	37	2,995	425	45,087	127	13,038
1835	521	55,735	28	2,194	433	46,925	125	11,523
1836	505	56,963	12	763	364	38,205	169	20,468

The imports consist chiefly of colonial produce, wool, wine, and British manufactured goods: the exports are, agricultural produce, linens, leather, oak bark, tallow, and salt.

Ostend was a small village in the ninth century, but two centuries later the port was much frequented. Old Ostend was destroyed by the sea in 1334. In 1372 the present Ostend was merely a fishing-place. It was enclosed with walls by Philip the Good in 1445, but was not regularly fortified until 1583 by the prince of Orange. The Dutch sustained a siege in this town against the Spaniards, which began in 1601 and lasted until 1604, when it surrendered by capitulation. It is said that the besieged lost during this time 50,000 men, and that the loss of the Spaniards was even more considerable. The town was taken by the allies in 1706, and in 1715 it was ceded by Holland to the emperor of Germany. Louis XV. took it in 1745, after a siege of 18 days, in which the town was greatly injured, and restored it in 1748. In 1794 it was taken by the French, and remained in their possession until 1814, having been unsuccessfully attacked by the English in 1798. Little trade was carried on during the war, but many privateers were fitted out from the port.

OSTERSUND. [SWEDEN.]

OSTERVALD, JEAN FRÉDERIC, born at Neufchâtel in Switzerland, in the year 1663, studied at Saumur, Orléans, and Paris, after which he returned to his native country, and in 1699 was appointed pastor of the Reformed church of the town of Neufchâtel. He became noted for his zeal in instructing his flock, as well as for his theological learning. He published an edition of the Bible in French, with arguments or explanatory heads to the books and chapters, which became very popular among the French Protestants under the name of 'Ostervald's Bible,' and of which there have been several reprints. He published also, 1, 'Abrégé de l'Histoire de la Bible;' 2, 'Traité des Sources de la Corruption qui règne aujourd'hui parmi les Chrétiens;' 3, 'Traité contre l'Impureté;' 4, a Catechism which is much used in the French Protestant churches, and is known by the name of 'Catéchisme d'Ostervald;' 5, 'Ethica Christiana;' and other religious works. Ostervald died at Neufchâtel, in 1747, much regretted. He and his two friends, J. A. Turretin of Geneva and Samuel Werenfels of Basel, did much toward the revival of religion in Switzerland; they were styled the 'Triumvirate of Swiss Divines.'

OSTIA, OSTIUM TIBERINUM, the name of the former port of Rome, situated at the southern mouth of the

Tiber, is 14 miles from the capital. The ancient town of Ostia, which was situated below the fork of the river, spread in a semicircular form along a bend made by the left or southern branch, on a piece of ground slightly elevated above the surrounding sand and marshes. Ostia was founded by Ancus Marcius, according to Strabo. It stood on a narrow peninsula between the river and the Lacus Ostiae, now Stagno di Levante, which formerly communicated with the sea, but is now separated from it by a considerable tract of sand. The port appears to have been a mere anchorage, near the site of the modern Torre Bovacciana, in which the Roman fleet used to be moored. It was open however and unprotected, for we read in Cicero (*Pro Lege Manilia*, xii.) that the Cilician pirates captured and plundered the fleet moored there, to the great disgrace of the Roman name. This anchorage ground has long been filled up with sand, and the sea is now nearly two miles from old Ostia. Strabo (p. 231, Casaub.) describes Ostia as having no port, and he says that the mouth of the river had become so choked up that only small vessels could ascend the stream. Rutilius Numatianus (A.D. 420) informs us that the southern branch of the Tiber was become impassable on account of the sand, but that small boats could still enter it. In the previous century Minucius Felix speaks of Ostia as being a very agreeable residence, with a mild climate and perpetual verdure. In the time of Procopius, about the middle of the sixth century, Ostia was in a ruined state and nearly deserted. The site is now marked by heaps of ruined buildings, which cover a considerable space, but are mere shapeless masses of small stones held together by cement. Excavations have been made and some statues and inscriptions have been found. There are some remains of a temple and of a theatre. Poggio, in the narrative of his journey to Ostia with Cosmo de' Medici, addressed to his countryman Niccoli, complains of the devastation committed in his time; he saw people employed in turning a temple of marble into lime.

The ports of Ostia being filled up and the southern branch of the river having become impassable for vessels, Claudius, and after him Trajan, thought of supplying Rome with a new port near the right or northern mouth of the river. The port of Trajan, which was destroyed by Totila, is now become a stagnant lagune, the sea having retired nearly two miles on that side also. There are some remains of the walls and aqueduct, and the place retains the name of Porto.

In the middle ages Ostia somewhat revived. In the fourteenth century it was occupied by Ladislaus, king of Naples. It was fortified by Sixtus IV., who built the castle. The French, who had seized it, were driven away by Cardinal della Rovere, afterwards Julius II., whose trophies are still in the cathedral. There are now about 100 inhabitants at Ostia in winter and about ten in summer. There is a small cathedral in good taste, a bishop's palace, and a few other habitable buildings. The castle or fort of Ostia consists of three or four lofty but ruinous brick towers joined by a curtain and surrounded by a ditch.

(Gell's *Topography of Rome and its Vicinity*, and *Map accompanying it*; Valery, *Voyages en Italie*.)

OSTIAKS. [SIBERIA.]

OSTRACEANS. [OYSTERS.]

OSTRACISM, the name for a singular institution existing for some time among the Athenians. When any man became conspicuous by wealth or by power, from whatever source derived, and was in consequence thought likely to entertain plans of ambition dangerous to the public peace and the stability of the existing form of government, this institution enabled the Athenian people to send him for a time into exile, and thus rid themselves of the danger which they dreaded. It was done as follows:—When the occasion was thought to require it, a day was fixed at an ordinary meeting of the Athenian people, for the purpose of holding an *Ostracism*. On that day a part of the market-place (*ἀγορά*) was railed in, ten different approaches being left to the part thus railed in. There was thus one approach for each of the ten Athenian tribes. By these approaches the citizens, distributed according to their tribes, entered the space within the rails, and there deposited, in urns provided for the purpose, their shells or bits of earthenware (*ὄστρακα*, *ostraca*, whence the name *Ostracism*), marked with the name of the person whom they respectively thought it desirable to banish. The nine archons, together with the Boulê and Prytanes, superintended, seeing that everything was done properly, and in the end counting the votes. First of all they counted the gross number, which it was necessary should be above six thousand, else there was no valid Ostracism. (Plutarch, in *Vit. Aristid.*) If there were found to be six thousand votes, then they proceeded to count the numbers against different individuals; and according to the account given by Plutarch, which, differing from another account, seems the more probable of the two, the individual against whom there was the greatest number of votes was straight sentenced to ten years' banishment, or (changing the phrase) was *ostracised*. The other account, for which the Scholiast on Aristophanes, and Pollux, are the authorities, says it was necessary that there should be six thousand votes against the individual ostracised, and that a mere majority short of six thousand was not sufficient. Whichever of these two accounts is adopted, the person who was ostracised was obliged to leave Athens within ten days after the sentence, and unless a vote of the people recalled him before the expiration of that time, to stay in exile for ten years. The goods of the ostracised person were not confiscated; neither was Ostracism considered in the light of a punishment or accounted a disgrace. It passed for what it was, a declaration of superior wealth, of superior influence, sometimes indeed of superior virtue, whose ascendency the state dreaded.

It is well known that Aristides the Just was one of those on whom Ostracism was inflicted. The story told by Plutarch of his writing down his own name for Ostracism is also well known.

The precise time at which the institution of Ostracism was introduced is not known. It is generally believed that it was introduced by Cleisthenes after the expulsion of the Peisistratidae (Ælian, *Var. Hist.*, viii., c. 24); and it has been said also that Cleisthenes was the first victim. This however does not rest on very good authority. The first person ostracised was most probably Hipparchus, a relation of Peisistratus; the last was Hyperbolus.

As to the merits of such an institution as Ostracism, there cannot be any great difference of opinion. That must be a bad form of polity which needs it, though under a bad form of polity it may be itself a good. The first object of the statesman is to construct a government proof against the wealth and power arising from the ordinary course of social development: if he fails in this, he must defend the government even at the expense of partial evil. The Athenians took care to mitigate the severity of the banishment, so far as they could consistently with the object of it. 'Though this institution,' says Montesquieu, 'may be so far a condemnation of popular governments, yet it is, on the other hand, well fitted to prove their mildness; and we should have perceived this, were it not that, exile being with us always a punishment, we have been unable to separate the idea of ostracism from that of punishment.' (*Esprit des Lois*, book xxi., chap. 17.)

A similar institution is said to have prevailed in Argos, Miletus, and Megara. At Syracuse also it prevailed, and there bore the name *Petalism*, leaves (*πέταλα*) being used on the occasion of voting, instead of shells.

OSTRA'CODA. [BRANCHIOPODA, vol. v., p. 241.]

O'STREA. [OYSTERS.]

OSTRICH. [STRUTHIONIDÆ.]

OSTROGOTHS, or Eastern Goths, a division of the great Gothic nation, were settled in Pannonia in the fifth century of our æra, from whence they extended their dominion over Noricum, Rhætia, and the Illyricum. [GOTHS.] About the year 482 or 483 A.D., their king Theodoric was serving as an auxiliary under the emperor Zeno, and distinguished himself in Syria. On his return to Constantinople, Theodoric, according to the statement of the historian Evagrius, fearing Zeno's jealousy of his success, retired into Pannonia in 487, where he collected an army, and in the following year marched into Italy, with all his tribe, men, women, and children, and, as appears, with the consent of Zeno himself, who wished to remove the Ostrogoths from his territories: he defeated Odoacer in various battles, took him prisoner, and some time after put him to death. Upon this event Theodoric sent an ambassador to Anastasius, the emperor of Constantinople, who sent him in return the purple vest, and acknowledged him as king of Italy. It appears that both Theodoric and his predecessor Odoacer acknowledged, nominally at least, the supremacy of the Eastern emperor. For the rest of the history of the Ostrogoths see THEODORIC, who established his dynasty over Italy, which is generally styled the reign of the Goths in that country.

OSTRO'PODA. [BRANCHIOPODA, vol. v., p. 241.]

OS'TRYA, or Hop Hornbeam, derives its English name from its inflorescence consisting, in the female, of scales packed closely over each other so as to resemble very much the head of a hop, and to its foliage being similar to that of the hornbeam. Two species are known: the one, *O. vulgaris*, a native of the South of Europe; the other, *O. virginica*, of the United States; these are possibly mere varieties of each other. They both form handsome deciduous trees, usually of small size, but sometimes acquiring a height of 60 feet. For figures and a more particular account, see Loudon's *Arboretum Britannicum*, p. 2015, fig. 1939 and 1940.

OSU'NA, a town in the kingdom or province of Sevilla, in Spain, situated in 37° 17′ N. lat. and in 5° 9′ W. long. It is above 40 miles from the city of Sevilla, and situated on one side of an extensive plain, at the foot of an eminence which is crowned by a church. The town is semicircular in form, and is of considerable size; it contains above 2300 houses, and 16,000 inhabitants. It has one parish church and a collegiate church, fourteen convents (suppressed in 1835), and eight hermitages; it has also four hospitals, two barracks, ten large inns, and a public granary. The university, which was celebrated in the time of Cervantes, was abolished by royal decree in 1824. The town is neat and pretty, and has some fine promenades and shady orchards in its immediate vicinity; it is deficient in good water. The climate is salubrious, except during the heats of summer, when, according to Miñano, the thermometer sometimes reaches 35° of Réaumur (110¾° Fahr.), and rises even higher when the wind is easterly. Some small lakes, a few miles to the north of Osuna, at that season also infect the air in their neighbourhood with nexious exhalations.

The population of Osuna is almost entirely agricultural; the only manufactures are mats, ropes, and baskets from the *esparto* rush (stipa tenacissima). The vast plain in which it stands is said to be the most fertile grain district of Andalucia. Barley and olive oil are the principal products, but it yields also much wheat, beans, peas, lentils, and other pulse, some wines of inferior quality, excellent capers, which are preserved with salt and sent to the neighbouring cities and even to America, and abundance of the coccus ilicis and reseda luteola, used in dyeing. It contains also large pasture-grounds, on which numerous horses, horned cattle, and swine are reared. The annual contribution of Osuna to the royal treasury exceeds 4000*l*.

Osuna is of very remote origin. Conde says it was anciently called Urso. Many Roman remains are still found in the town. The Arabs called it Oshuna.

(Miñano; Conde, *Aledris*.)

OSWEGO. [CANADA.]

OSWESTRY, a corporate town in the parish and hundred of Oswestry and county of Salop, 16 miles north-west from Shrewsbury, 160 north-west from London (direct distances), and on the road from London to Holyhead. 'On this spot,' says Pennant, 'celebrated in Saxon history and legendary piety, on August 5, 642, was fought the battle between the Christian Oswald, King of the Northumbrians, and the pagan Penda, King of the Mercians. Oswald was defeated and lost his life. The barbarian victor cut the body of the slain prince into pieces and stuck them on stakes dispersed over the field as so many trophies. . . . . From the fate of the king the place in aftertimes was named Oswald's Tree, now Oswestry. (*Tour in Wales*, London, 4to., 1778, pp. 246-8.) The miracles reputed to have been wrought by means of the earth taken from the field in which the remains of the prince were interred, are detailed by Bede in his 'History of the Primitive Church,' and occupy several pages of that work (Hurst's *Translation*, London, 1814, iii., chap. 9-13).

Oswald was admitted by the Romans into the list of their saints, and a church was raised to commemorate his martyrdom. In the corporate seal he is represented in his robes, holding a sword in his right hand and an oak-branch in his left; above, are the words, 'De Oswaldatre sigillum commune.' In the vicinity of the town, at a place called by the Welsh 'Cae Naef' (Heaven's Field), there is a remarkably fine spring of water, which bears the name of Oswald's Well, and over which, as recently as the year 1770, were the ruins of a very ancient chapel, likewise dedicated to him.

The first charter was granted to the town in the reign of Henry II., by William earl of Arundel, the lord of the manor. The son of this nobleman having taken part with the barons against King John, the latter (1212) marched upon the town and reduced it to ashes. A similar fate befel it, about a century afterwards, at the hands of Llewellyn, prince of North Wales, and it continued to suffer from border-warfare until Edward I., in 1277, ordered it to be surrounded by a wall and ditch. Some portions of this wall are yet standing, but the four gates were removed in 1769. The charter of Richard II., granted in 1397, after the attainder and execution of Richard earl of Arundel, exempts the burgesses from all customs throughout the kingdom, the liberty of the city of London excepted; and among other privileges acquired by them during this reign, was that of compelling the inhabitants of the eleven towns within the hundred to bring their cattle, corn, victuals, and wares for sale in the market-place of Oswestry before sending them to any other market or fair. The lord's Welsh tenantry of the hundred were also bound by their tenure to keep watch and ward for three days and three nights at the gates of the town during the fairs of St. Andrew and St. Oswald, but instead of protecting they were found to ravage and plunder the place, whereupon they were dismissed from that duty and compelled to pay a sum of money to Englishmen for the safe custody of the town. (Pennant, p. 257.)

The boundary of the present municipal borough extends about two miles east and west of the town, and half a mile north and south, and is divided into two wards. The governing body is composed of 6 aldermen and 18 councillors. The town is paved and lighted under a local act, and is increasing in extent, particularly on the English side. It contains a town-hall and a small gaol, erected in 1825. The church, erected since 1616, is spacious and surmounted by a plain tower. The vicarage is in the diocese of St. Asaph and patronage of Earl Powis, and yields an annual net revenue averaging 477*l*. The trade of the town is facilitated by the Ellesmere canal and the Llanymynech branch, which pass within four or five miles. The manufactures are chiefly coarse linens and woollens. The market-day is Wednesday, and fairs are held in March, May, June, August, and December. The population of the town, in 1831, was 4478, and that of the entire parish 8581.

By an Act of 33 Geo. III., all the parishes within the hundred of Oswestry, with the exception of the parish of Melverly, are incorporated for affording relief and employment to the poor, and a spacious house of industry has been built in the vicinity of the town. The number of inmates, in 1831, was 273. There is a free grammar-school, national school, and Sunday-school. In the national school there are from 230 to 240 boys, and from 150 to 170 girls, all of whom receive daily instruction. The grammar-school was founded by David Holbetche or Holbeck, prior to the year 1634. It is open to all boys born within the parish who are able to read. The average number of scholars upon the foundation has not for many years exceeded fifteen. In addition to these the master usually has about twenty pay boarders. Much of the property belonging to the charity has probably been lost, and that from which the present revenue is derived, amounting only to 268*l*. 11*s*. 6*d*., appears to have been recovered with difficulty. There are other smaller charities in this place.

(Camden's *Britannia*; Price's *History of Oswestry*, 8vo, 1815; *Twenty-Fourth Report of the Commissioners on Charities for* 1831, vol. ii., pp. 424-36.)

OSYTH, ST. [ESSEX.]

OTAHEITE, or more properly *O Tahiti*, is the largest of the Society Islands, a considerable group situated in the Pacific Ocean, between 16° and 18° S. lat. and 1[illegible]° and 153° W. long. Otaheite is about 35 miles long, and more than 130 miles in circumference. It consists of two peninsulas, of unequal extent, united by a low isthmus, somewhat more than 3 miles wide. The north-western and larger peninsula is called Opureone or Tahiti-nue (Great Tahiti), and the south-eastern Tiarrabooa, or Tahiti-iti (Little Tahiti). The surface is estimated to be about 430 square miles, or equal to the county of Bedford. The island is surrounded at a distance of from 3 to 6 miles by a coral-reef, which has several breaks, and affords many good anchorages, as the sea within the Opureone is not agitated by the winds. The most remarkable are, Mattaway Bay, near the north-eastern extremity; Soanoa Harbour, four miles westward of Mattaway;

and Papara towards the north-western extremity of the island, which is now most frequented by European vessels. The interior of both peninsulas is occupied with mountain masses, which terminate in high and sharp peaks. The most elevated of these peaks, called [illegible], rises to between 7000 and 8000 feet above the sea-level; it is nearly in the centre of the larger peninsula. Some of the summits of the smaller peninsula are nearly as high. Except these peaks, the whole island, especially the lower hills, is covered with thick woods. The hills extend from the centre of the peninsula in all directions towards the shores, and approach them in some places within less than half a mile, enclosing level valleys, which extend 5 or 6 miles inland, to the foot of the high rocky masses. These valleys are watered by fine streams, on the banks of which, as well as on the shores of the sea, are built the dwellings of the inhabitants. Lava, basalt, and pumice-stone, which occur in several places, seem to indicate that this island, like all the elevated islands of the Pacific, owes its origin to volcanic agency.

The climate is very mild, the difference of temperature in the winter and summer months being inconsiderable. It is also very healthy, except during the rains, which occur from the beginning of December to the end of February, but even then diseases are not frequent. The productions are numerous, especially the plants which supply food for man. The bread-fruit trees and cocoa-palms are regularly planted, and batatas, yams, taro, and bananas are cultivated with care; the sugar-cane, which is of excellent quality, tobacco, and some other tropical plants are also cultivated. Cotton and indigo are only cultivated by the Europeans, the natives being too indolent to bestow the necessary labour on them. Several wild plants also afford food, especially the arrow-root, which is collected in May, and a considerable quantity of which is exported; there are also the casuarina-tree, a kind of [illegible], and figs. Cloth is made, as in other islands of the Pacific, of the inner bark of the bread-fruit tree, the paper mulberry-tree, and the hibiscus; of the last also ropes are made. Oil is extracted from the cocoa-nut. The interior produces timber in great abundance. Forests cover all the mountains of Tiarrabou, and the southern declivities of those of [illegible]. Some vessels have been built of the timber. When the Europeans first visited the island, the only domestic animals were pigs, dogs, and fowls. The missionaries have introduced cattle, horses, sheep, and goats. The cattle and goats thrive, but the sheep and horses do not succeed so well. Wild birds are numerous, especially pigeons, ducks, and several kinds of parrots.

Otaheite was discovered in 1606, by the Spaniard Quiros, and called Sagittaria, but as his description was not correct, Captain Wallis, who visited the island in 1767, considered it as a new discovery and called it King George's Island; and Bougainville, who visited it in the following year, named it Nouvelle Cythère. Cook, who visited it between 1769-78 several times, gave it the native name, and published a very interesting account of the island and its inhabitants. He estimated the population at 200,000. After having been visited by several other navigators, missionaries were sent there to convert the islanders, in 1797. They found the natives, as they had been described, friendly to strangers and devoid of all treachery; but they discovered that several immoral practices existed among them, as infanticide and human sacrifices. There were also continual wars among them. For fourteen years the labours of the missionaries were fruitless, and they were treated with contempt. But in [illegible] the king of the island, Pomaree II., embraced Christianity, and introduced it among the natives. After his death (1821), during the minority of his son, the missionaries acquired a greater influence, and by their advice a constitution was formed, and written laws were made (1825); but as neither the constitution nor the laws are understood, and are not founded on the customs and usages of the natives, they are entirely neglected. The introduction of Christianity has however effected the abolition of infanticide, of human sacrifices, and other immoral practices; it has also established peace. Before the son of Pomaree attained the age of manhood, he died, and was succeeded by his sister the queen Aimata. The government is a despotism; the sovereign possesses absolute power over the land, and may by an order deprive any chief or person of his landed property; each chief also possesses the same absolute power over the land of each individual who lives in his district. The missionaries assert that, according to a census taken several years ago, the population did not exceed [illegible] souls, and they attribute the great decrease to the venereal disease, which was introduced by Europeans, to the continual wars, and to infanticide. The natives belong to the Malay race, and speak a language which may be considered as a dialect of that widely spread language. They have made some progress in civilization, as is shown by their manufacture of cloth, called *tappa*, their boats, which are large enough to carry 150 persons, their dwellings, and several utensils. But they have still profited little by the presence of the missionaries, the churches being built of wooden frames filled with wattled hibiscus, and covered with a compost of sea-sand and lime, which again is whitewashed. The culture of their fields and gardens has also not materially changed. It cannot be said that there exists a commerce, as there is no currency. Small quantities of cocoa-nut oil, arrow-root, timber, and sugar are bartered for ribbons, cloth, &c., and these are the only articles which are exported. (Cook's *Voyages*; *London Geogr. Journal*, vols. i., iii., v.)

OTA'RIA. [Seals.]

OTHMA'N (*Ibn Affán*), the third khalif of the Moslems after Mohammed, was a direct descendant from Abd-al-menaf, one of the ancestors of the prophet. Having early adopted Islám by the persuasion of Mohammed, he became one of his most zealous *sahábi* (companions), followed him in his flight from Mecca to Medina, and was made, on his return, one of his most confidential friends and secretaries. [Mohammed.] Othman was one of the six individuals to whom the khalif Omar had by his will entrusted the designation of a successor. After mature deliberation, the majority chose Othman, on condition that he would govern the people according to the rules of the Korán; Othmán solemnly promised to do this, and he was accordingly invested with the supreme power towards the end of Dhí-l-hajjah, A.H. 23 (Nov. or Dec., A.D. 644), three days after the death of Omar. His first public act was to send a body of troops under Al-mughayrah Ibn Shaabah to complete the reduction of the province of Hamadan (A.D. 645), while another army expelled Jezdegerd from Persia (A.D. 646). [Omar.] Another body of Arabs (A.D. 647) reduced all that part of Khorassán which had escaped former invasions. In the meanwhile Abdullah Ibn Said invaded western Africa, and, after defeating and killing at Yakúbiyyah the patrician Gregorius, who commanded in the Grecian emperor's name, subdued its principal cities. Four years afterwards (A.D. 651) the same commander made an incursion into Nubia, and obliged the Christian sovereign of that country to sue for peace and pay him tribute. The islands of Cyprus and Rhodes were attacked and plundered by Muawiyah Ibn Abí Sufyán (A.D. 648): these two maritime expeditions being the first which the Arabs ever made. While the Mohammedan empire was thus extending on all sides, Othmán was rapidly losing the affections of his subjects by the weakness of his internal administration and his partiality towards the members of his family. Abú-l-feda, the Arabian historiographer, says, that some one having suggested to Omar on his death-bed to appoint Othmán his successor, he exclaimed, 'God forbid that I should; Othmán is too much inclined to favour his own friends and relatives.' In this judgment Omar was not mistaken. Othmán began by removing the celebrated Amrú Ibn Al-ass from the government of Egypt—a country which he had conquered—and appointing in his place his own foster-brother Abdullah Ibn Said. This measure was as disagreeable to the Arabs as to the Egyptians. The people of Alexandria, who bore impatiently the Mohammedan yoke, and were only kept in obedience by the mildness and the justice of their governor, seeing a favourable opportunity, entered into a correspondence with the Greek emperor, and surrendered to him the city; and, though Othmán immediately reinstated Amrú, who recovered Alexandria and demolished its fortifications, this was not accomplished without great difficulty and considerable bloodshed (A.D. 646). Saad Ibn Abí Wakkass and Abú Músa Al-ashari, two of Mohammed's companions, were also deprived by him of their command. Othmán rendered himself further obnoxious by occupying on the *Mimbar* (pulpit), and while at prayers in the mosque, the same place which the prophet had used, instead of placing himself, as his predecessors Omar and Abú Bekr had done, a few steps lower down. He had also lost from off his finger a silver signet ring which had once belonged to the prophet, and with which the khalifs his predecessors had sealed their despatches—

an ominous circumstance, which was regarded by all zealous Moslems as the greatest blow that could be inflicted on their rising empire—and he had recalled from his exile Hakem Ibn Aass, whom the prophet himself had banished from Mecca. Othmán was further accused of excessive prodigality towards his favourites. These and other complaints against Othmán increasing the public discontent, the elders of the Arabian tribes and the most illustrious among the companions of the prophet met at Medina, and having drawn up a memorial in which their charges, nineteen in number, were fully specified, they despatched with it one of their number, Ammar Ibn Iásir, threatening Othmán with immediate deposition unless he gave a satisfactory answer to every one of them. Othmán resented this as an outrage upon his authority, and caused Ammár, the bearer of the memorial, to be so severely beaten by his slaves, that he was left for dead on the ground. This unjustifiable act inflamed the passions of the people, who now openly demanded Othman's abdication. Deputations from all the provinces of the empire, having the same object in view, reached Medina, and Othmán was closely besieged in his palace by a large body of insurgents. In vain did Othmán promise to restore to the treasury the sums he had abstracted, to redress all grievances and answer all complaints; the fury of the people increased instead of abating, and they would undoubtedly have committed violence upon his person had not Ali, who had considerable influence among the insurgents, promised in the khalif's name that all causes of complaint should be immediately removed. The tranquillity, by these means restored, was but of short duration. Ayesha, the widow of the prophet, who hated Othmán, and who had seen with envy his accession to power, now openly favoured the pretensions of Talhah to the khalifate. By her authority among the Arabian tribes, as well as by her intrigues, she succeeded in creating great disaffection against Othmán, and attaching the most influential people in the empire to her interests. She bribed Othmán's secretary, Merwán Ibn Hakem, to transmit false orders in his master's name. One of these, addressed to Abdullah, governor of Egypt, bid him put to death Mohammed, son of the khalif Abú Bekr, who was then residing at Alexandria, and followed the party of Ayesha. No sooner was the khalif's order made known, than Othmán's enemies eagerly urged Mohammed to revenge the affront. He accordingly marched against Medina, which he entered without opposition, and invested Othmán's palace. After making some resistance, Othmán's soldiers left him to his fate. Placing a Korán in his bosom, the khalif calmly awaited the arrival of the assassins, who, headed by Mohammed, rushed into the room. The incensed youth seized Othmán by the beard, and plunged his sword into his breast; others pierced his body in different parts, and he expired under numerous wounds. For three days his mutilated corpse lay unburied and exposed to the insults of the populace, until it was at length thrown into a hole. This happened, according to At-tabári and Abú-l-fedá, on the 18th day of Dhi-l-hajjah, A.H. 35 (18th June, 656); other historians assign earlier dates to this deplorable event, although all agree in placing it within that month. Othmán reigned twelve years, and was eighty-two, others say ninety, and even ninety-five years old when he died. He had been married to two of the daughters of the prophet, Rakiyyah and Om-al-Kolthúm, owing to which he is generally designated by the Arabian historians under the surname of *Dhú-n-núreyn* (he of the two lights). Othmán is described as a man of majestic figure and venerable aspect; he was pious and well versed in the Korán, which he is reported to have transcribed several times. He was the first who caused an authentic copy of the Korán to be made, from which all others were to be transcribed. He entrusted the revision of it to Zeyd Ibn Thábit, Abdallah Ibn Zobeyr, and other companions of the prophet. Until the eleventh century of our æra, a copy of the Korán called *Mushafu-l Othmáni* (the volume of Othmán) was preserved in the great mosque at Cordova, being thought by some authors to contain four leaves of the Korán which Othmán placed in his bosom, and stained with his blood, and by others to be one of those copies which the khalif was known to have written himself.

(As-soyútí's *History of the Khalifs*, in MS., in the Brit. Mus., No. 7324; Abú-l-fedá, *An. Mosl.*, vol. i., p. 240, *et seq.*; Al-makin *apud* Erpenium, p. 31, *et seq.*; Abú-l-faraj, *Hist. Dynast.*, translated by Pococke, p. 57, *et seq.*; Ockley, *Hist. of the Saracens*, vol. i.; Price's (Major) *Retrospect of Mohammedan History*, vol. i.)

OTHMA'N I., surnamed Al-ghází (the Conqueror), the founder of the dynasty now reigning at Constantinople, was born at Súkút in Bithynia, in 657 of the Hejira (A.D. 1259). The Turkish and Arabian historians do not agree as to his ancestors and origin, but the most generally received opinion is, that he was the son of Orthogrul, a Turkman or Oguzian chieftain, who, having entered into the service of the sultán of Iconium, established himself with his tribe at Surgút, on the banks of the river Sangar. It is further related that his grandfather Suleymán left his native steppes in the Má-wará-l-nahr (beyond the Oxus), passed into Khorassán at the time of the invasion of Genghis Khan (A.D. 1218-19) [GENGHIS KHAN], and settled at Keláth in Armenia. After the death of Suleymán, who was drowned in the Euphrates, his son Orthogrul succeeded him in the command of the tribe. He marched farther into Asia Minor, and entered the service of Alao-d-din Caycobad, the ninth sultán of the Seljúkian dynasty, whose reign began in A.D. 1213. Having received lands to settle in with his tribe, Orthogrul rendered important services to Alao-d-din and his successors, aiding them in their wars against the Tartars and against the Greeks. Orthogrul died in A.H. 680 (A.D. 1280), leaving his son Othmán to succeed him in the government of the colony. After the death of Masúd II., the last of the Seljúkides, his dominions being shared among his generals, part of the province of Bithynia fell to the lot of Othmán, who thus found himself the master of a small territory. The first campaigns of this conqueror were directed against the Greeks. In July, A.D. 1299, having first forced the slightly-defended passes of Mount Olympus, he invaded the territory of Nicæa, and subdued the whole country, except the capital itself, which fell four years afterwards into his power (1304). In 1307 he invaded and reduced the country of Marmara. The annals of the first years of his reign exhibit the same repetition of successful inroads, until, seeing his army increased by captives and volunteers, he meditated and carried into execution greater undertakings. Instead of retreating as before, after each incursion, to the hills, he maintained the most useful and defensible posts, fortified the towns and castles, and strove to maintain every foot of ground which he gained from the enemy. In the course of many years of warfare he conquered the remainder of Bithynia and the neighbouring provinces; and although he was several times repulsed in his attempts upon Nicomedia and Prusa, he kept those cities in awe by means of strong fortresses which he erected in their neighbourhood. At length his son and successor, Orkhán, gained possession of Prusa, but the welcome news did not arrive till Othmán was almost insensible, owing to old age and infirmities. Othmán died in A.D. 1326, in the sixty-ninth year[*] of his age and the twenty-seventh of his reign, reckoning from his first invasion of Bithynia. He held his court at Cara-Hissar and coined money in his name, but he never took the title of sultan. Such was the commencement of the Turkish empire [TURKEY], which, from his name, has received the appellation of Othoman or Ottoman Porte. The memory of Othmán is held in such veneration by the Turks, that, on the accession of a new sultan to the throne of Constantinople, no greater compliment can be paid to him than to wish him as happy a reign, as long a life, and all the kindness of Othmán. He was famed for his moderation, his justice, his military talents, and his prudence: he left to his son Orkhán a book of maxims and rules for the government of an empire, which are much esteemed.

(Von Hammer's *Journey from Constantinople to Brussa and to the Olympus*, Pesth, 1818, and *Geschichte des Osmanischen Reichs*, Pesth, 1827; D'Ohsson, *Tableau de l'Empire Othoman*; Abú-l-fedá, *An. Mos.*, vol. v.; Deguignes, *Histoire des Huns.*)

OTHMAN, IBN YAHIA ALCAISI, was born of a noble family at Malaga in Andalucia. He is mentioned as a man of great and varied talents, and as having been eminent in philosophy, law, and medicine. He was made governor of Malaga, and died A.H. 735 (A.D. 1334). He was the author of a work containing many grammatical questions (*Quæsita Grammatica*); another, 'De Hæreditate,' and a third, 'De Mensuris Hispanis.' (Casiri, *Biblioth. Arabico-Hisp. Escur.*, t. ii., p. 109.)

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[*] Sixty nine lunar or Mohammedan years make little more than sixty seven Christian years.

OTHO, MARCUS SALVIUS, was born on the 28th of April, A.D. 31 or 32. He was descended of an honourable family, which originally came from Ferentinum (*Ferentino*), and which traced its origin to the kings of Etruria. His grandfather, who belonged to the equestrian order, was made a senator through the influence of Livia Augusta, but did not rise higher in office than the praetorship. His father, Lucius Otho, was advanced to offices of great honour and trust by the emperor Tiberius, whom he is said to have resembled so closely in person as to have been frequently taken for a near relation.

Marcus Otho was an intimate friend of Nero during the early years of his reign, and his associate in his excesses and debaucheries; but Nero's love for Poppaea, whom Otho had seduced from her husband, and to whom he was greatly attached, produced a coolness between them, and ultimately occasioned the honourable banishment of Otho to the province of Lusitania, of which he was appointed governor. In this province, which he governed, according to Suetonius (*Otho*, c. 3), with great justice, he remained for ten years; and afterwards took an active part in opposition to Nero and in placing Galba upon the throne, A.D. 69. Otho appears to have expected, as the reward of his services, that he should have been declared his successor; but when Galba proceeded to adopt Piso Licinianus as his successor, Otho formed a conspiracy among the guards, who proclaimed him emperor, and put Galba to death after a reign of only seven months. [GALBA.]

Otho commenced his reign by ingratiating himself with the soldiery, whom Galba had unwisely neglected to conciliate. He yielded to the wishes of the people in putting to death Tigellinus, who had been the chief minister of Nero's pleasures, and he acquired considerable popularity by his wise and judicious administration. He was however scarcely seated upon the throne before he was called upon to oppose Vitellius, who had been proclaimed emperor by the legions in Germany a few days before the death of Galba. Vitellius, who was of an indolent disposition, sent forward Caecina, one of his generals, to secure the passes of the Alps, while he himself remained in his camp upon the Rhine. Otho quickly collected a large army and marched against Caecina, while he sent his fleet to reduce to obedience Liguria and Gallia Narbonensis (compare Tac., *Agr.*, 7.) At first Otho was completely successful. Liguria and Gallia Narbonensis submitted to his authority; while Caecina was repulsed with considerable loss in an attack upon Placentia. But shortly after, Otho's army was completely defeated by the troops of Vitellius in a hard-fought battle near Bedriacum, a village on the Po, south-west of Verona. Otho, who does not appear however to have been deficient in bravery, had been persuaded for the security of his person to retire before the battle to Brixellum; a step which tended, as Tacitus has observed, to occasion his defeat. When he was informed of the result of the battle, he refused to make any further effort for the empire, and put an end to his own life by falling upon his sword, at the age of 37, according to Tacitus (*Hist.*, ii. 50), or of 38, according to Suetonius (*Otho*, c. 11), after reigning 95 days. Plutarch relates that the soldiers immediately buried his body, that it might not be exposed to indignity by falling into the hands of his enemies, and erected a plain monument over his grave with the simple inscription, 'To the memory of Marcus Otho.'

(Tacitus, *Hist.*, books i. and ii.; *Life of Otho*, by Suetonius and Plutarch; Dion Cassius, lib. lxiv.)

Coin of Otho.
British Museum. Actual size. Copper.

OTHO I., son of the emperor Henry I., and duke of Saxony, was elected, after his father's death, A.D. 937, his successor on the throne of Germany. His reign was long and eventful; a great part of it was occupied in quelling the rebellions of the great feudatories, the dukes of Bavaria, Franconia, and Lorraine, the archbishop of Mainz, and of his own son and son-in-law, who had rebelled against him. He waged also a long and successful war against Boleslas, duke of Bohemia, who, having murdered his own father, had abolished Christianity and thrown off his allegiance to the empire. He conquered the Slavi of the region bordering on the Oder, and founded two bishoprics, Havelburg and Brandenburg, in order that they might furnish missionaries for the conversion of the Slavi to Christianity. Otho defeated also the Danes, for whose conversion he founded bishoprics in Holstein and Schleswig. In the year 955 he gained a great victory over the Huns. In Italy he appeared first as the champion of Adelaide, the young widow of king Lotharius, who had been imprisoned and otherwise ill-used by Berengarius, who, after poisoning Lotharius, had usurped the Italian crown. Otho liberated Adelaide, whom he married at Pavia, in the year 951, and forgave Berengarius, and allowed him to retain the sovereignty of Italy, but as his vassal. Otho then returned to Germany. After seven years, fresh complaints of the tyranny of Berengarius induced Otho to recross the Alps: he defeated Berengarius and his son and colleague Adalbert. He was himself acknowledged by a Diet held at Milan as king of Italy, and crowned by the archbishop with the iron crown of the Longobards in the church of St. Ambrose, at the close of A.D. 961. In the following year Otho repaired to Rome, where pope John XII. crowned him emperor of the West, as being the successor of Charlemagne. Berengarius, who had still some followers, defended himself obstinately in the fortress of St. Leo, in the Romagna; but being taken, was sent prisoner to Bamberg, where he died.

Meantime Otho, having received numerous complaints against pope John, whose licentiousness and tyranny had become insupportable to the people of Rome, and who moreover maintained secret intelligence with the partisans of Berengarius, again visited Rome, and assembled a council, in which John was deposed, and Leo VIII. elected in his place. John however, after Otho's departure, re-entered Rome, obliged Leo to run away, and committed many acts of cruelty against those who had favoured the exaltation of his rival. [JOHN XII.] John soon after died, A.D. 964, and the Roman clergy, disregarding the former election of Leo, appointed another pope by the name of Benedict V. This brought Otho again to Rome, which he besieged and took. He banished Benedict and reinstated Leo, who however died the year after, when John XIII. was elected with Otho's approbation. But the Romans, revolting against the new pope, banished him into Campania. Upon this Otho again entered Rome, and having put the leaders of the insurrection upon their trial, hanged thirteen of them, and condemned the others to various punishments. The historian Liutprandus justifies the conduct of Otho on this occasion, saying that he merely exercised his imperial prerogative, like his predecessors of the Byzantine and Carlovingian dynasties, against men who had violated their oaths and rebelled against his authority. This shows that at that time the duchy of Rome was still considered as subject to the emperors.

In the year 967 Otho had his son Otho II. crowned emperor and his colleague, at Rome, by pope John XIII. In the following year Otho sent Liutprandus on a mission to Nicephorus Phocas, emperor of Constantinople, which however produced no friendly result. [LIUTPRANDUS.] Otho accordingly invaded the provinces of Campania, Apulia, and Calabria, which were subject to the Byzantines, and laid siege to Bari, which however he did not take. Nicephorus in the meantime being murdered, his successor Zimisces made peace with Otho, and gave the princess Theophania in marriage to his son, A.D. 972. Otho returned to Germany, where he died in May, 973. Otho has been styled 'the Great,' a title which he deserved for his abilities, his success, and his love of justice. His policy towards the see of Rome is worthy of notice, for whilst he showed himself zealous for the interests of the church, endowed abbeys and convents, and honoured deserving men among the clergy, yet he always asserted his sovereign right in temporal matters, and in the elections of the popes, a right which his successors continued to exercise for a long time afterwards until the pontificate of Gregory VII. In Italy he established the supremacy of the German emperors over the greater part of the peninsula, with the exception of the southern provinces, which remained subject to the Eastern empire.

OTHO II., son of Otho I., was engaged after his father's death in a war with Henry, duke of Bavaria, whom he defeated, and whose fief he bestowed on the duke of Suabia. He had also to contend against Lotharius, king of France, for the possession of the great fief of Lotharingia, or Lorraine, which had been a subject of contention between France and Germany ever since the separation of the two crowns. Otho divided Lorraine into two fiefs, upper and lower, the latter of which he left to Charles, Lotharius's brother, on condition that he should pay allegiance to the German crown. In the year 979 Otho repaired to Italy, where things were, as usual, in a state of great confusion. At Rome he repressed sedition, and punished several of the leaders. From Rome he proceeded into Campania, and interfered in the interminable quarrels of the various princes of Capua, Benevento, and Salerno; and from thence advanced into Apulia and Calabria, where he fought against the Saracens, who had landed in those provinces, and who were encouraged, as it was said, by the Byzantine emperor, who was afraid of losing his Italian dominions through Otho's ambition. Otho occupied Tarentum, and at first was successful against the Saracens; but he afterwards was defeated by them with great slaughter. (Sigonius; Ditmar; Muratori.) Otho, returning to Northern Italy, assembled a general diet of the feudatories of Germany and Italy at Verona, in the year 983, at which his son, then four years old, afterwards Otho III., was acknowledged as his successor. At that diet several laws were added to the Longobard code, and Otho confirmed the franchises and privileges of the republic of Venice by a diploma, in which are enumerated the provinces that were subject to the kingdom of Italy as distinct from those belonging to Venice. The former are Pavia, Milan, Cremona, Vicenza, Ceneda, Verona, Friuli, Istria, Ferrara, Ravenna, Comacchio, Rimini, Pesaro, Cesena, Fano, Sinigaglia, Ancona, Umana, Fermo, Pinna, and Gabella, a statement which contradicts the pretended grant of the Exarchate and Pentapolis, said to have been made by Otho I. to the see of Rome. From Verona, Otho proceeded to Ravenna, and afterwards to Capua and Benevento, intent upon collecting a large army against the Saracens, whom he wished to expel from Sicily. But in the month of December, 983, he fell ill at Rome, where he died, and was buried in the atrium of the Vatican Basilica.

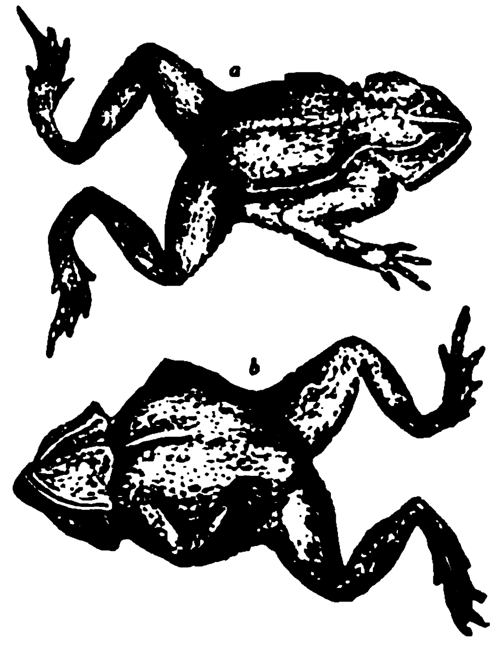
OTHO III. spent his long minority in Germany, whilst his grandmother Adelaide, his mother Theophania, and the archbishop of Cologne administered his dominions in Germany and Italy. In the year 996 Otho entered Italy with a large army, and was crowned emperor of Germany, at Rome, by Pope Gregory V., who was his own relative. On his return to Germany, he defeated the Slavi, with whom he was engaged in a war, and forced Micislas, duke of Poland, to do him homage. He afterwards conferred upon his successor, Duke Boleslas, the title of king of Poland. At the end of 997, Otho returned to Italy; and after staying awhile at Pavia and Ravenna, being desirous of seeing Venice, a city then already celebrated for its wealth and power, he repaired thither incognito with six attendants. The doge Pietro Orseolo II. entertained him splendidly by night, but left him to enjoy his assumed disguise during the day. The doge had just effected the conquest of Dalmatia from the Croatians, with the islands of Curzola and Lesina, and had assumed the title of duke of Dalmatia. Otho held a daughter of the doge's over the baptismal font, and on that occasion he exempted the Venetians from the pallium, or annual tribute, which they used to pay to the kings of Italy. Having returned to Ravenna, he collected his army and marched upon Rome, from whence Pope Gregory V. had been expelled by the patrician Crescentius, styled consul of Rome; a remarkable character of the dark ages, who aspired to re-establish the Roman republic under a nominal allegiance to the Eastern emperors. Crescentius caused John, a Calabrian Greek, to be proclaimed pontiff, under the title of John XVII. On the arrival of Otho, John ran away; but being seized by those of the adverse party, he was cruelly mutilated; and Crescentius, after defending himself in the castle St. Angelo, was also made prisoner and beheaded, with twelve of his followers. Otho returned to Germany, but in the year 1001 he was again in Italy. He fought several battles in Campania, besieged Benevento, and afterwards quelled some fresh disturbance in Rome. In the following year, 1002, he was taken ill near Civita Castellana and died. His body was taken to Aquisgrana to be buried.

OTHO IV., duke of Brunswick and son of Henry the Lion, was elected king of the Germans in 1208, and was afterwards crowned emperor at Rome by Innocent III. But he soon quarrelled with that imperious pontiff about the right of nominating to vacant benefices. Otho returned to Germany, where Waldemar, king of Denmark, was extending his conquests along the southern coast of the Baltic. Soon after a general discontent, which was encouraged by the clergy, burst out against him, and he was deposed in 1212; and Frederic of Hohenstauffen, king of Sicily, was called to fill the throne of his ancestors. Otho however had still a considerable party, and he protracted the contest till 1215, when he resigned his claims to his rival. [FREDERIC II., EMPEROR.]

OTHO, or OTTO, OF FREYSINGEN, born about 1108, was the son of Leopold, margrave of Austria, and of Agnes, daughter of the emperor Henry IV. He studied first at Nürnberg and afterwards in the university of Paris, after which he entered the order of St. Bernard in the abbey of Morimond, of which, in 1136, he was made abbot. His relative Conrad III., king of the Germans, recalled him to his native country and made him bishop of Freysingen in 1138. He afterwards followed Conrad in the crusade to Palestine. On his return, he felt a wish to visit the abbey of Morimond again, where he died, after a short illness, in 1158, much revered for his knowledge and piety. He wrote a chronicle of the world in 7 books, 'Ottonis Episcopi Frisingensis Rerum ab origine Mundi ad ipsius usque Tempora,' fol., Augsburg, 1515. The first four books of this Chronicle are a mere compilation from Orosius, Eusebius, Isidore of Seville, and other previous writers; but the last three books contain much original information, especially concerning the affairs of Germany in the 10th, 11th, and 12th centuries. Otho is a remarkably impartial historian, and sufficiently judicious for the times in which he lived. His Chronicle was continued down to the year 1210 by another Otho: 'Appendix Ottonis à S. Blasio à fine libri septimi Ottonis usque ad annum Salutis,' 1210. The other works of Otho of Freysingen are—1, A treatise concerning the end of the world, according to the Book of Revelations, which is generally appended to his Chronicle; and 2, A history of the emperor Frederic I., called Barbarossa, 'De Gestis Frederici Ænobarbi libri duo,' which comes down to the year 1159, but has been continued by Radewik, canon of Freysingen, down to 1160. Otho is one of the most trustworthy historians of the period generally called the dark ages.

(Vossius, *De Historicis Latinis*; Fabricius, *Bibliotheca Latina mediæ ætatis*.)

OTILOPHES (*Otilophi*), Cuvier's name for a group of *Batrachians* [FROGS, vol. x., p. 491], which have the muzzle



Rana margaritifera.

a, seen from above; b, placed on its back to show the under parts, granules, and the head furnished on each side with a crest which extends over the parotid portion.

Type, *Rana margaritifera*, Gmel.

Description.—*Head* triangular, approaching to square above, and with elevated borders, presenting an appearance somewhat resembling the episcopal mitre; *eyes* of a fine colour; *body* above red-brown, speckled with lighter red granules dispersed throughout like small pearls; a white stripe from the nose to the end of the rump; thighs and feet marbled with light yellowish; a small white line springing from the nose runs down on each side of the head and along the sides of the belly, which is whitish and granulated also like the back and upper parts.

Locality.—Brazil, where, according to Seba, it is called *Jaquaru*.

OTION. [Cirripeda, vol. vii., p. 207.]

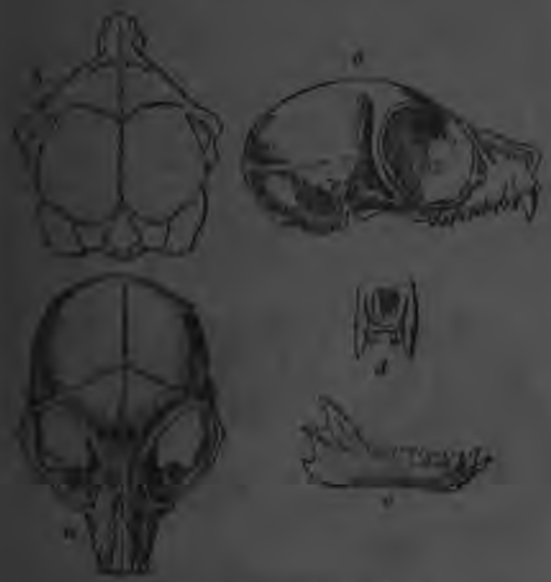
OTIS. [Bustard.]

OTOLICNUS, Illiger's name for the *Galago* of Geoffroy. Dental formula, this is generally given by authors thus:—

Incisors, $\frac{2}{6}$ or $\frac{4}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{6-6}{5-5}$.

In the species which we select to illustrate the form, Dr. Andrew Smith found the dentition as follows:—

Incisors, $\frac{4}{6}$; canines $\frac{1-1}{1-1}$; false molars, $\frac{2-2}{2-2}$; true molars $\frac{4-4}{3-3}$ = 18 in each jaw.



Skull and teeth of Galago Moholi. (Smith.)

a, Front view of skull; *b*, back view of same; *c*, lateral view; *d*, front view of the anterior portion of upper jaw; *e*, lateral view of lower jaw. All the figures nat. size. (Smith.)

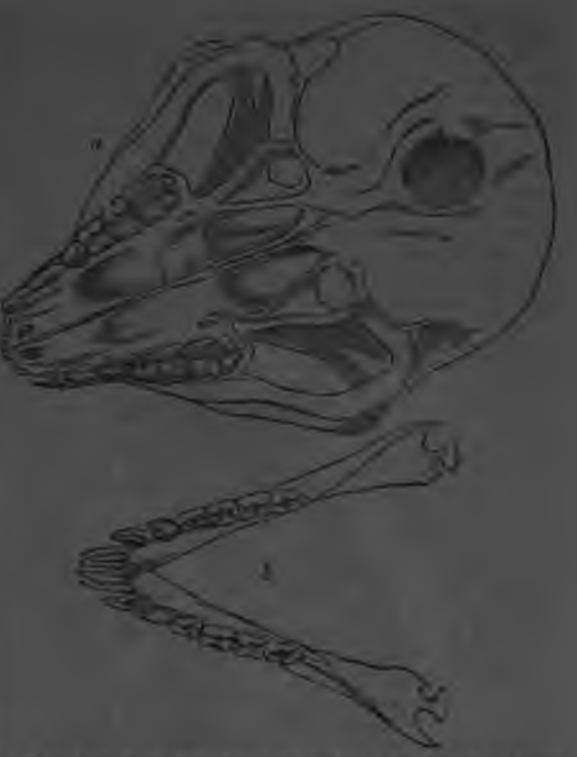
Generic Character.—Head rounded, muzzle short; eyes very large; ears very large. Feet pentadactyle; all the nails flat with the exception of the first digit of the hind feet, which is armed with a sharp subulate claw. Two teats. Tail very long, terete, and villous.

Geographical Distribution of the Genus.—Africa, to which Mr. Swainson adds India.

Habits.—Arboreal. The great size of the orbits will at once strike every observer. The large development of the eyes requires such spacious receptacles; and this development is necessary on account of the nocturnal habits of the genus. The food of these animals consists of soft fruits, and, from the structure of the teeth, probably of insects also. They are fond of vegetable gum, and their large ears are said to be closed when they sleep, but to be opened upon their hearing the least noise.

We select as an example the *Galago Moholi* of Dr. Smith.

Description.—*Colour*: Upper parts of the head and neck, the back, the sides of the body, and the outer and hinder surfaces of the extremities intermediate between pearl and yellowish grey; the back is finely brindled from the dark colour of the basal portion of the fur being here and there seen through the surface tints; the extremities are of a lighter hue than the other parts enumerated, and their outer and hinder surfaces are distinctly tinted with yellow; the middle of the face, the lips, the sides of the head, below and behind the eyes, the chin, throat, abdomen, and the upper surface of the fingers white; inner surfaces of extremities white, tinged with yellow. Tail glossy; the colour intermediate between yellowish-brown and cochineal red; the fur is throughout of the same colour; that of the other parts is a dark slate-colour except at and near its surface. Ears flesh-coloured; and the down, which is very sparingly scattered over their outer surface, is pure white. Eyes deep topaz yellow; the palms of the hands and under surface of the fingers are of a flesh-colour tinged with brown. *Form, &c.*—Figure slender and elegant. Head broad, subglobular, and anteriorly terminated by a short, high, and almost pointed nose. Ears large, bare, and patulous, their tips rather narrow and slightly rounded; the outer margin of each ear has two faint emarginations, and the internal or anterior surface of each is distinctly marked with four or more transverse ridges; the eyeballs and the pupils large; anterior extremities short and slender; posterior ones long, rather robust, and each is terminated by four fingers and an opposable thumb, the tips of which are dilated and depressed; the nail of the forefinger of each of the hinder extremities is narrow, convex, considerably elongated beyond the soft parts, and obtusely pointed; all the other nails both of the anterior and posterior extremities small, thin, flat, roundish or ovate in form, and not extended to the points of the fingers. Tail cylindrical, slender towards the base, much thicker towards and at the tip, which arises from the fur being longer on those parts. On the head, body, and extremities the covering consists of a very fine short woolly fur, which on the tail and the upper surface of the fingers is rather harsher. Palm of the hands and under surface of the fingers naked. (Smith.) Length from nose to tip of the tail, sixteen inches.

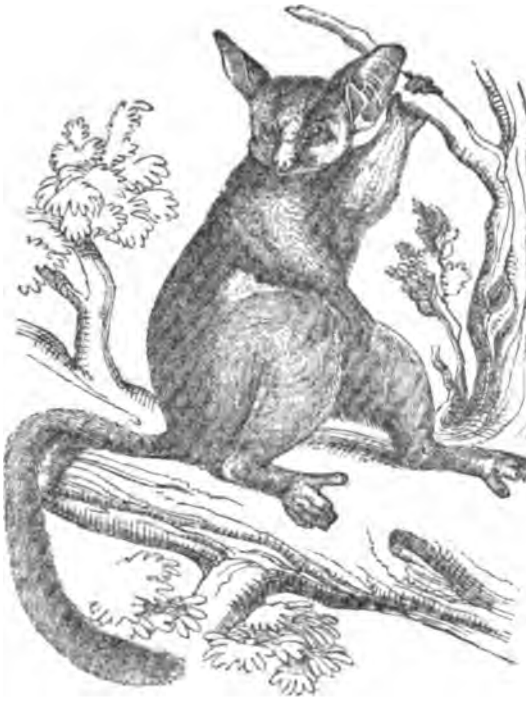


a, Basal view of skull, exhibiting the teeth; *b*, lower jaw. Both figures double the nat. size. (Smith.)

Locality, Southern Africa, and probably Western Africa.

Habits, Reproduction, Food, &c.—The first specimens observed by Dr. Smith were upon trees close to the Limpopo river, in about lat. 25° south, and from that parallel he continued to observe others as the expedition travelled. They were very active, springing from branch to branch and tree to tree with extraordinary facility, and always seized the branch on which they intended to rest. In their manners they considerably resembled the monkeys, particularly in grimaces and gesticulations. According to the natives, the species is entirely nocturnal, and rarely to be seen during the day, which the animal spends in the nest which it has formed in the forks of branches or in cavities of decayed trees; and in these nests, constructed of soft grass, the females bring forth and rear their young (generally two at a birth). Dr. Smith states that the food of the Moholi consists principally of pulpy fruits, though there is reason to believe it also consumes insects, as remains of the latter were discovered in the stomachs of several individuals which he examined.

Dr. Smith, for the reasons stated in his work, considers this animal different from *Galago Senegalensis*. He gives an elaborate anatomical description and good figures of the more important and interesting parts of this animal.



The Moholi.

Our figures are taken from those in the 'Illustrations of the Zoology of South Africa,' a work now in the course of publication under the authority of the Lords Commissioners of Her Majesty's Treasury, and equally valuable both for the extent and novelty of its information and the beauty and accuracy of the illustrations.

Place in the System.—Illiger places *Otolicnus* in the fourth family (*Macrotarsi*) of his second order (*Pollicata*), associated with *Tarsius*. The *Macrotarsi* stand in his arrangement between the *Prosimii* and the *Leptodactyla*.

Cuvier, placing the genus between *Stenops*, Ill., and *Tarsius*, arranges it under the *Quadrumana*.

Mr. Gray, in his 'Outline' (*Ann. Phil.*, 1825), makes *Otolicnus*, *Galago*, and *Cheirogallus** the genera which form his *Galagonina*, the fourth subfamily of his *Lemuridæ*.

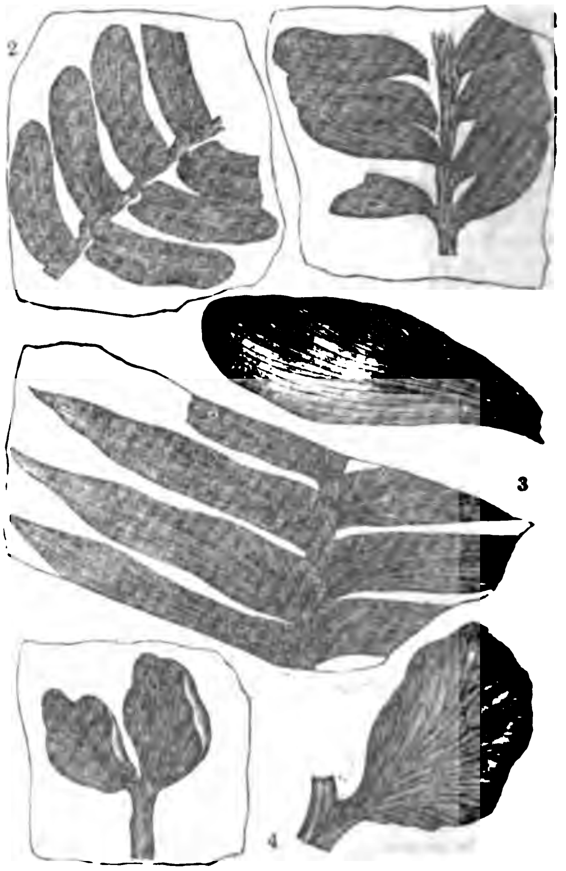
M. Lesson (1827) gives *Galago*—he does not notice Illiger's name—a position between *Nycticebus* and *Tarsius*; and J. B. Fischer (1829) places *Galago*, Geoff. (*Otolicnus*, Ill.) between *Jacchus* and *Tarsius*.

Cuvier (*Règne Animal*) expressed his opinion that the *Lemur Potto* of Gmelin should be referred to this group; and M. Lesson places that animal under *Galago*, with the name of Galago Potto, *Galago Guineensis*, Desm.

Mr. Swainson, who considers that nearly all the Lemurs appear to be referrible to two primary groups, the Lemurs proper (*Lemur*) and the Galagos (*Otolicnus*, Ill.), views the first group as eminently frugivorous, and the second as carnivorous, preying upon small birds, insects, and reptiles, and representing the *Feræ*. This latter group, *Otolicnus*, is, he observes, in general distinguished by the size of their hinder feet, or rather of the tarsus and toes, in which respect he thinks they offer a beautiful analogy to *Mænura*, *Rallus*, and *Crateropus* among birds. He traces the passage between the Lemurs and the Galagos in the genus *Stenops* of Illiger, where the tail, as in *Lichanotus*, is either very short or entirely wanting; and considers the remarks of Mr. Bennett (*Gardens and Menagerie of the Zoological Society*, vol. i.) on the impropriety of separating the slow-paced Lemur (*Stenops tardigradus*) from the slender Lemur (*Stenops gracilis*) to be well founded, observing that both belong in fact to the scansorial type, and that the latter is absolutely necessary to connect the former with the genus *Tarsius*. Mr. Swainson further states that much uncertainty hangs over an animal loosely described by Bosman under the name of *Potto* (*Lemur Potto*, Gm., *Nycticebus Potto*, Geoff.), which seems to have the form and the slowness of motion seen in the *Stenops tardigradus*, but yet to possess a long tail. 'Whether,' adds Mr. Swainson, 'such an animal exists or not, certain it is that no other could present a more natural link of connection between *Stenops* and *Otolicnus*. In this latter form, the tail is again remarkably developed; but, although tufted, it does not present that bushy and ornamented character which so much distinguishes the genuine Lemurs. It is not improbable that these Galagos, which have only two upper cutting teeth, as the *O. Demidoffii* and *Senegalensis*, belong to a different type from the others, where the upper cutting teeth are four in number; certain however it is that the *Tarsius Bancanus*, Horsf., or Great-headed Gorlago, is a genuine type of nature.' This last form has been elevated by Mr. Swainson to the rank of a genus under the name of *Cephalopachus*, and *Otolicnus* in his arrangement stands between *Stenops* and that genus in the family *Lemuridæ*. (*Classification of Quadrupeds*, 1335.)

O'TOMYS. [MURIDÆ, vol. xv., p. 103.]

OTO'PTERIS is a genus of fossil ferns, of which several species have been described. Its distinguishing character is to have simply pinnated leaves, whose leaflets are auricled at the base, where they join the rachis by a narrow stalk, and are furnished with veins which proceed directly from the base to the apex, without any attempt at forming a midrib. Five certain species only are known, from the beds above the coal-measures, and chiefly from the lias and oolitic formations, of which they are a characteristic feature: these are *O. cuneata*, *Beanii*, and *acuminata*, from the oolite, *obtusa* from the lias, and *Dufresnoii* from the new red-



1, Otopteris dubia; 2, Otopteris obtusa; 3, Otopteris acuminata; 4, Otopteris cuneata.

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* 'Cheirogaleus' must be meant.

[illegible]. There is moreover an *O. dubia* from the [illegible] coalfield, and an *O. ovalis* from the Scarborough oolite beds, of which are doubtful species; the latter in particular must be excluded from the genus, and probably belongs to Neuropteris. A detailed account of the species will be found in the *Fossil Flora*, vols. ii. and iii., where the genus was first established, and where are figures from which the annexed cuts have been borrowed.

It is probable that the genus is the same as either the modern Adiantum, or Lindsæa, with both which it agrees in the venation of the leaves.

OTRANTO, TERRA DI, one of the territorial divisions of the kingdom of Naples, is also called 'Provincia di Lecce,' from the name of its present head town. It occupies the whole Iapygian or Messapian peninsula, being bounded by the province of Bari on the north-west, by that of Basilicata on the south-west, and by the sea on every other side. Its greatest length is about 100 miles, from north-west to south-east, and its greatest breadth is about 30 miles, but it becomes much narrower as it approaches the promontory of Leuca. The peninsula is traversed in its length by a ridge of low calcareous hills, which are an offset of the mountains of Basilicata, and run to the cape of Leuca. There are no rivers properly so called in this peninsula, but the springs and drainings of the hills on both sides form streams, most of which are absorbed by the soil or lose themselves in marshes before they reach the sea. Nearly the whole of the low tract of land along the sea-coast on both sides of the peninsula is unwholesome and thinly inhabited, with the exception of the towns of Brindisi, Otranto, Taranto, and Gallipoli; but the interior, being more elevated and dry, is wholesome, and produces oil in abundance, wine, corn, and pasture for cattle. The oil is chiefly exported from the port of Gallipoli.

The population of the province, which in 1827 amounted to 3[illegible],000, was, in 1837, 365,294. This population is distributed among four districts: Lecce, Taranto, Brindisi and Gallipoli, which are subdivided into 122 communes and 1[illegible] parishes. More than two-thirds of the population live by agriculture. There are about 200 vessels (chiefly small craft) and boats belonging to the province. The manufactures are of no great importance. (Petroni, *Censimento de' reali Dominj di qua del Faro*; Serristori, *Statistica d'Italia*.)

The principal towns of the province of Otranto are:—1, Brindisi; 2, Lecce; 3, Taranto; 4, Gallipoli. Gallipoli is a town of considerable commercial importance, built on a rocky peninsula. It contains, together with the suburb called Lizza, about 12,000 inhabitants, is a bishop's see, has a good roadstead, and a harbour lately constructed by means of a mole. It is the most trading seaport on the Ionian side of the kingdom. It has ample cisterns cut in the rock for containing the oil, which is the chief produce of the country. Gallipoli exports oil, wool, wine, and other produce of neighbouring provinces. The tunny fishery employs also many persons. 5, *Otranto*, the antient Hydruntum, once a flourishing town, has been in a decaying state since its capture and pillage by the Turks in 1480. Its present population hardly exceeds 3000, and the surrounding country is marshy, unhealthy, and uncultivated. Otranto has an old cathedral, a castle, and a harbour which is not very safe. From Otranto, on a clear day, the opposite coast of Epirus and the lofty Acroceraunian Mountains can be seen. (Keppel Craven, *Tour through the Southern Provinces of the Kingdom of Naples*.)

The following towns are also in the province of Otranto: Alessano, near Capo Leuca, with about 7000 inhabitants; Castellaneta, with 5000; Nardò, with 8000; Francavilla, with 12,000; and Manduria, with 8000, and a remarkable well in the neighbourhood, mentioned by Pliny (*Hist. Nat.*, ii. 106), the water of which always retains the same level, whatever quantity is drawn from it. Some Greek or Epirote colonies are scattered about the province: the principal villages inhabited by them are S. Marzano, Martano, and [illegible]. They still speak a corrupt Greek, and retain something of their national dress. Many of the 'masserie,' or farm-houses, in this part of the country are built like forts, and occupy a considerable extent of ground, in which the country-people, in the case of a landing being made by the Turkish corsairs, to which they were exposed for some centuries, or of incursions of inland banditti, could take refuge with their cattle and movable effects. A wall, high and strongly built, forms a parallelogram, against one side of which the dwelling-house is built, containing two or three habitable rooms and sometimes a chapel; the granaries, stables, and outhouses are on the other side, and in the middle of the enclosure is a round or square tower two stories high, standing quite alone. The ascent to the first story is either by some steps inserted in the tower or by a moveable ladder.

This remote province was, in the year 1816, after the restoration of King Ferdinand, the scene of a singular warfare between the royal troops and a considerable body of partisans belonging to the secret political associations of that period, who called themselves 'European Patriots,' 'Decisi,' 'Carbonari,' &c. The armed partisans were led by a priest named Ciro Annichiarico, who had been formerly in the prison of Lecce for committing several murders, but had contrived to escape. These outlaws assumed the name of the 'Salentine Republic,' and issued proclamations threatening with death those who should refuse them assistance. They had a black standard with the cap of liberty on a skull between two axes, and other symbols of a like character. After they had committed many excesses and kept the country in a state of anarchy for nearly two years, King Ferdinand sent against them General Church, with a body of 1200 soldiers and full powers. After some fighting, Ciro Annichiarico was surrounded and taken in the masseria of Scasserba, ten miles from Francavilla. He was tried before a court-martial, condemned, and executed in February, 1818, with above 100 followers. A curious account of the whole business is given in the 'Memoirs of the Secret Societies of the South of Italy,' London, 1821, translated from the French MS., which was said to have been written by Bartholdy, who was at one time Prussian diplomatic agent at Rome and Naples.

The peninsula of Otranto was antiently called by various names: Iapygia, Messapia, Calabria, and the country of the Salentini. The antient Iapygians or Messapians were probably native tribes of the great Oscan family [Apulia]; they were looked upon as barbarians by the Greeks, who had formed settlements upon their coasts. Thucydides (vii. 57), in the muster of the Athenian forces before Syracuse, names the Iapygians as auxiliary barbarians. They were often at war with the Greeks of Tarentum, whom they defeated with great loss about the year of Rome 281 (Herodotus, vii. 170; and Diodorus, xi. 52); but they were afterwards repeatedly defeated by Archytas. The name of Iapygia was given by the Greeks to the whole of Apulia as far north as Mount Garganus. The Romans divided the same antient tract between Apulia and Calabria. The coins found at Acerenza, Oria, and other places in this region bear Oscan characters. Horace calls the people of Canusium 'bilingues,' because they spoke Greek besides their native tongue; and the vulgar language of Rudiæ, the birth-place of the poet Ennius, was likewise a dialect of the Oscan. (Gellius, xvii. 17.) Further particulars concerning the antient history of this country are given under Taranto.

OTTAJA'NO. [Naples, Province of.]

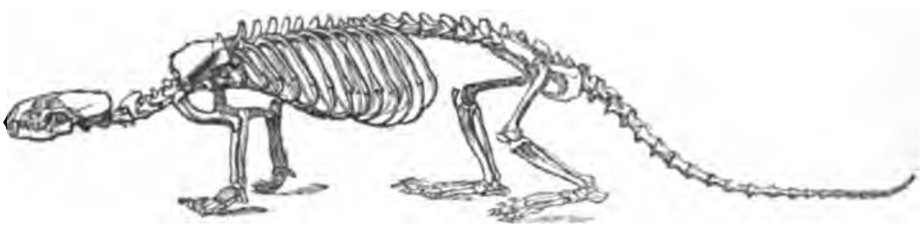
OTTAWA. [Canada.]

OTTER. The Otters (*Lutra*, Linn.) form a natural group of carnivorous animals whose habits are aquatic and whose food is fish. They consist of two forms nearly allied: the first, including the *River Otters*, *Lutra* of Storr; the second, the *Sea Otter*, *Enhydra* of Fleming.

ORGANIZATION.

Skeleton; Skull.—In the Otters the suborbital hole is larger than it is in the badgers, the gluttons, and the martens, almost as large, indeed, as it is in the rodents; their muzzle is shorter and the anterior part of the cranium between and behind the orbits more compact; their tympanic cavities are less convex; their entire cranium more depressed, and its base wider and flatter. The lachrymal bone is entirely within the orbit, and its aperture is above the interior suborbital hole. The circular aperture is blended externally with the spheno-orbital hole, but internally it is separated by a considerable interval from it by a bony plate. The internal pterygoid process is widened. The whole skull has a good deal in common with that of the seal (*Phoca vitulina*); and its relationship is to be traced in the short muzzle, the compression of the interorbital region (which is carried still farther in the seal), the width and flatness of the cranium, and the flatness and enlargement of the whole inferior region, with the exception of the tympanic cavities, which in the seal are large and convex.

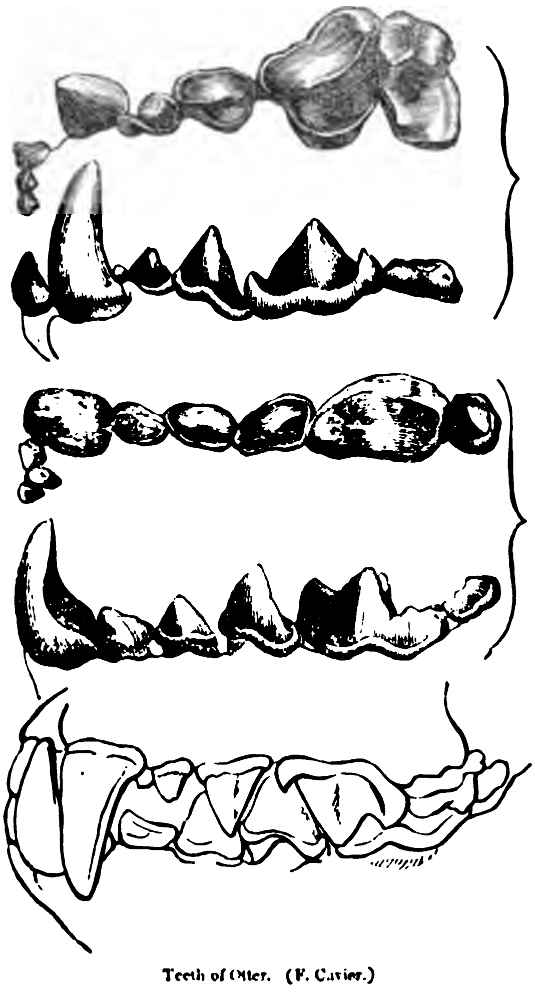
In the other parts of the skeleton there is nothing to justify a detailed description, the variations being such as might be expected to suit the habits of an aquatic, carnivorous, hairy quadruped. Thus, the articulation of the limbs admits of such freedom of motion, that the animal can turn them in almost any direction, and bring them with ease on a line with the body, so as to act like fins



Skeleton of European River Otter, Lutra vulgaris.

Digestive Organs.—The teeth of the Otters are sharp and strong, and the tubercles of the molars very pointed, a modification necessary to secure the prehension and speedy destruction of their agile and slippery prey. In the length of the intestines there is a difference between the *Common Otter* and the *Sea Otter;* the latter, like the *Seal*, has very long intestines. Sir Everard Home gives the length of the intestines of the Sea Otter as twelve times that of the animal; but those of the Common Otter as only three times and a quarter the length of the animal. (*Phil. Trans.*) Professor Owen however informs us that in a female common otter dissected by him, the intestines were 9 feet 6 inches, the body from nose to vent being 1 foot 5 inches; and we should expect, physiologically, to find longer intestines in a common otter than in one of the land *Feræ*.

Urinary and Genital Organs.—The kidney is lobulated or conglomerated, consisting, in fact, of an aggregation of small kidneys, connected by cellular substance; but these small kidneys are not so numerous as in the seal and porpoise. (Home on the 'Sea Otter,' *Phil. Trans.*) In the Museum of the Royal College of Surgeons (Physiological Series, No. 2519) is a preparation exhibiting the testes penis, anus, and anal glands of the Common Otter.



Teeth of Otter. (F. Cuvier.)

Nervous System and Senses.—Taste, smell, and hearing appear to be well developed. Sight remarkably quick. Touch moderate, except about the muzzle, lips, and whiskers, where it appears to be acute.

Generic Character. [LUTRA.]—*Head* compressed; *eyes* rather large; *ears* very short; *whiskers* very stiff; *tongue* rather rough; *body* very much lengthened; *legs* short; the *feet* with five toes and webbed; *tail* long, stout, flattened horizontally, and covered with short hair.

Dental Formula:—Incisors $\frac{6}{6}$; canines $\frac{1-1}{1-1}$; molars $\frac{5-5}{5-5} = 36$.

EUROPEAN LUTRÆ.

Example.—*Lutra vulgaris*, Erxleb. *Mustela Lutra*, Linn.

Description.—Head and nose broad and flat, neck thick, body elongated. Tail broad at the base, compressed horizontally, and tapering to a point.

The eyes, which are not large, are placed comparatively near to the nose; the ears are very short and the auditory opening rather narrow. The mouth is small and the lips are capable of being firmly closed together. The whiskers are very long, the legs very short, strong, stout, and muscular. The five-toed feet are furnished with strong broad webs, like those of water-fowl which have these accessories best developed. Hence Somerville terms the Otter 'goose-footed.'

Colour.—Brown (deepest on the upper parts), with the exception of two small patches of white on the lips, one on each side of the nose.

Size.—This species varies much in size. The length of one sent to Mr. Bell from Sutherlandshire was two feet one inch and six lines. Mr. Macgillivray notes the length of two males; one measured 42 inches, and the other 35 inches. By the same author, the length of a female is given at 40 inches. These measurements are from the nose to the point of the tail. Mr. Bell states that the usual weight of a fine male English Otter is from 20 to 24 pounds, and that of the female about 4 pounds less; adding however that Pennant records one found, in 1794, in the river Lea between Stratford and Ware that weighed 40 pounds.

This, there can be little doubt, is the ἐνυδρίς (Enhydris) of Aristole and the Greeks, and the *Lutra* of the antient Italians. It is the *Lodra*, *Lodria*, and *Lontra* of the modern Italians; *Nutria* and *Lutra* of the Spanish; *Loutre* of the French; *Otter* and *Fisch Otter* of the Germans; *Otter* of the Dutch; *Utter* of the Swedes; *Odder* of the Danes; *Dyfrgi* of the Welsh; *Balgair*, *Cu-donn* (Brown Dog), and *Matadh* of the Northern Celts; and *Otter* of the modern British.

Habits, Food, Reproduction, &c.—The natural food of the Common Otter is fish, for the chace and capture of which its whole frame is beautifully adapted. How silently is the water entered! The eyes are so placed that whether the animal is swimming below its prey, behind it, above it, or beside it, their situation, or, at most, the least motion of the head and neck, brings it within the sphere of the pursuer's vision. The whole frame-work of the animal, its short fin-like legs, oary feet, and rudder of a tail, enable it to make the swiftest turns, nay, almost bounds in the water, according as the rapidity of its agile prey prevents a sudden downward dive, an upward spring, or a side snap. The short fur, which is close and fine, keeps the body at a proper temperature, and the longer and outer hairs directed backwards enable it to glide through the water, when propelled horizontally by its webbed feet beneath the surface, noiselessly and speedily. Easy and elegant in its motions there are few objects more attractive in menageries than the pond, especially if it be kept clean and supplied with clear water, wherein the Otter is seen to hunt its living prey. When it has seized a small fish, it usually leaves the water and devours it, beginning with the head, whilst the body is held between the fore-paws. Larger fish are held down by the paws, and the head and tail are often left uneaten. The havoc made by these animals in the rivers and ponds is great; for they will go on killing, and eat but a small portion of each fish, if it be large, when they find plenty of prey. When fish is scarce and it is pressed by hunger Mr. Bell states that the Otter has been known to resort far inland, to the neighbourhood of the farm-yard, and attack lambs, sucking-pigs, and poultry. Mr. Macgillivray tells us, also, that it has been known to devour young domestic animals, and the latter zoologist found the stomach of one, which was killed in June, filled with a curious collection of larvæ and earth-worms. The period of gestation is said to be nine weeks, and the number of young produced varies from three to five. The Otter's places of refuge near rivers and lakes are beneath the roots of trees or in holes.

But it must not be supposed that the *Common Otter* is, as it has been asserted, confined to the fresh-waters. They are known to frequent the sea in the north of Scotland and to hunt for [illegible]. In the south of England (Cornwall) the Otter will go a mile from the shore in the summer and good weather after its prey, according to Mr. Couch. On the sea-shore, rocky caves with scattered blocks, hollows, and cavities under large stones, are its haunts. These marine common otters must not be confounded with the *Sea Otter* (*Enhydra*).

That the Common Otter is capable of domestication and attachment we have ample testimony. Albertus Magnus, Aldrovandus, Gesner, and others attest this. Every angler will remember the passage in Walton, where good Mr. Piscator is anxious to possess himself of one of the young otters which the huntsman, after the death of the 'bitch otter,' had found. 'Look you,' says the huntsman, 'hereabout it was she kennelled; look you, here it was indeed, for here's her young ones, no less than five; come, let's kill them all.' "No," exclaims Piscator, "I pray, Sir, save me one, and I'll try if I can make her tame, as I know an ingenious gentleman in Leicestershire, Mr. Nich. Seagrave, has done; who hath not only made her tame, but to catch fish, and do many other things at pleasure.' Buffon, who could be as hard of belief in some points as he was credulous in others, disbelieves the otter's capability for domestication. The testimony above noticed has been confirmed by a cloud of modern witnesses. Goldsmith mentions an otter which went into a gentleman's pond at the word of command, drove the fish up into a corner, and having seized on the largest, brought it out of the water to its master. Daniel, Bewick, Shaw, record instances of the animal's docility in this way. Mr. Bell and Mr. Macgillivray both corroborate the fact. The latter has collected the following anecdotes. 'Mr. M'Diarmid, in his amusing "Sketches from Nature," gives an account of several domesticated otters, one of which, belonging to a poor widow, when let forth, plunged into the Urr or the neighbouring burns, and brought out all the fish it could find. Another, kept at [illegible] House, Wigtonshire, evinced a great fondness for [illegible], fondled about her keeper's feet like a pup or kitten, and even seemed inclined to salute her cheek, when permitted to carry her fondness so far. A third, belonging to Mr. Monteith of Carstairs, was also very tame, and though he frequently stole away at night to fish by the pale light of the moon and associate with his kindred by the river side, his master, of course, was too generous to find any fault with his peculiar mode of spending his evening hours. In the morning he was always at his post in the kennel, and no animal understood better the secret of keeping his own side of the house. Indeed his pugnacity in this respect gave him a great lift in the favour of the gamekeeper, who talked of his feats wherever he went, and vowed besides that if the best dog that ever ran "only ventured to gurr" at his protégé, he would soon "mak' his teeth meet through him." To mankind however he was much more civil, and allowed himself to be gently lifted by the tail, though he objected to any interference with his snout, which is probably with him the seat of honour.' They are however dangerous pets; for, if offended, they will bite grievously.

Utility to Man.—The capability of the Otter for domestication being proved, there is no doubt that the animal might be trained to catch fish or assist in fishing. For this purpose Mr. Bell states that the following method has been recommended:*—they should be procured as young as possible, and be first fed with small fish and water. Then bread and milk is to be alternated with the fish, and the proportion of the former gradually increased till they are led to live entirely on bread and milk. They are then taught to fetch and carry, as dogs are trained, and when they are brought to do this well, a leather fish stuffed with wool is employed as the thing to be fetched. They are afterwards exercised with a dead fish, and chastised if they attempt to tear it. Finally they are sent into the water after living fish.

As an article of food, though the flesh is rank and fishy, the otter was not rejected by the Roman Catholics. Their church permitted it to be eaten on maigre days; and Pennant saw one in the kitchen of the Carthusians near Dijon, under preparation for the dinner of the religious of that rigid order, who, by their rules, are prohibited during their whole lives from eating flesh. Mr. Macgillivray states that he knew a man in Harris who procured a considerable number every year, when the skins were more in request than now, and who generally cooked the flesh, of which Mr. Macgillivray once partook with the family. It was 'dark-coloured, rank, sapid enough, but not agreeably so;' and under the skin was a layer of fat, as in the seals, which might, he adds, render it pleasant food to a Greenlander or starving Hebridian.

Varieties.—Before we refer to the undoubted *varieties* of this species, it is necessary to notice an *Irish Otter*, which Mr. Ogilby has elevated to the rank of a species, under the name of *Lutra Roensis*, on account of the intensity of its colouring, which approaches nearly to black both on the upper and under surface; of the less extent of the pale colour beneath the throat, as compared with the English *Lutra vulgaris*; and of some difference of the ears, and in the proportions of other parts. The marine habits of the animal, which is found chiefly in hollows and caverns formed by scattered masses of the basaltic columns of the east coast of Antrim, where a price is set upon its head in consequence of its destruction of the salmon, strengthen Mr. Ogilby in this opinion, from which Mr. Bell differs, observing that Mr. Ogilby states that he had not had an opportunity of comparing it with the *Common Otter*, that he (Mr. Bell) does not find in the stuffed specimen presented by Mr. Ogilby characters sufficiently distinct to lead to the belief that it is more than a very dark and handsome variety, and that two skins of Zetland otters (which are equally marine in their habits) presented to him (Mr. Bell) are almost as dark-coloured; Mr. Bell adds that these skins are larger than those usually found in England; and that the fur is nearly as fine as those imported from America.

The variety spotted with white is supposed to be the 'King of the Otters' of the Scotch vulgar, who hold that it bears a sort of charmed life, in so far that its death is never unaccompanied by the death of a man or some other living creature. The skin is considered precious as an antidote against infection, wounds, and the dangers of the sea. One of these spotted otters is in the museum at Paris, near which place it was found. Mr. Macgillivray says that he has heard of white otters, but had never seen an albino.

Chase.—In the older annals of sporting in this country, otter-hunting holds no inconsiderable place. Somerville describes it at some length and with much unction in his fourth book (*Chace*) towards the end. It is now fast dying away; but is still kept up in some places, as in Wales and Scotland. The pretty vignette at the close of Mr. Bell's interesting history of the Otter† was taken as one of the mementoes of a day's sport in Glamorganshire not long ago. Mr. Macgillivray‡ informs us that Mr. Lomax hunted the Dumfriesshire rivers in 1833, 1834, and 1835, and that

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* See Goldsmith.

† 'British Quadrupeds,' 1837.

‡ 'Naturalist's Library—Mammalia,' vol. vii., 1838.

Lord John Scott keeps a pack of otter-hounds for the streams of Roxburghshire.

Geographical Distribution.—Europe generally.

Lutra vulgaris.

ASIATIC LUTRÆ.

Example, *Lutra Nair.*

Description.—Fur deep chestnut, lightest on the sides; lower part of the neck and cheeks, as well as the throat, reddish bright brown; above the eye a ruddy yellow or yellowish-white spot.

This is the *Nir-nayie* of the people of Pondichery, and is probably the species seen by Bishop Heber, who passed a row of nine or ten large and very beautiful otters, tethered with straw collars and long strings to bamboo stakes on the banks of the Matta Colly. 'Some were swimming about at the full extent of their strings, or lying half in and half out of the water; others were rolling themselves in the sun on the sandy bank, uttering a shrill whistling noise as if in play. I was told that most of the fishermen in this neighbourhood kept one or more of these animals, who were almost as tame as dogs, and of great use in fishing; sometimes driving the shoals into the nets, sometimes bringing out the larger fish with their teeth.' Another proof, if any were wanting, of the feasability of taming these animals and rendering them useful to man.

Geographical Distribution.—East Indies. N.B. Colonel Sykes notes, in his list of *Mammalia* obtained in Dukhun (Deccan), '*Lutra Nair*, F. Cuv., *Juhl Marjur* or *Water-Cat* of the Mahrattas. The *Otter* of Dukhun differs only from the *Nair* in wanting the white spots over the eyes, in having a white upper lip, and in being somewhat larger.' (*Zool. Proc.*, 1830-31.)

AFRICAN LUTRÆ.

Example, *Lutra Capensis* (genus *Aonyx* of Lesson).

Description.—Fur soft, full, and thick, chestnut brown, deepest on the rump, limbs, and tail, brighter on the sides, and brownish-grey upon the head; under part of the body white. Length two feet ten inches from the muzzle to the tail, which is one foot eight inches.

Observations.—M. Lesson allows that this species, which he has elevated to the rank of a genus, possesses the same general characters as the *Lutræ*, such as the dentary system and form of the body; and makes the difference solely consist in the form of the feet and toes, which he says are hardly joined by a membrane. He states that the second toe would seem conjoined to the third throughout its first articulation. These toes are both more elongated than the succeeding ones, and all the toes are without claws, or rather, a vestige of a rudimentary nail is only observed on the second and third toes of the posterior feet. He records the species as *Aonyx Delalandii*, Lutra inunguis of G. Cuv. and F. Cuv., *Dict. Sc. Nat.* But Cuvier, in his last edition of the 'Règne Animal,' writing on the Cape Otter (*Lutra Capensis*, Fr. Cuv.), remarks that the white of the throat, the sides of the head, and of the neck is more pure than [illegible] Javanese *Simung* (*Lutra Leptonyx*, Horsf.), and [illegible] some of this colour at the end of the nose; but, [illegible]t most distinguishes it is that (at a certain [illegible]) it has no nails, a character on which M. Lesson [illegible] the genus *Aonyx*. Nevertheless, continues Cuvier in conclusion, young individuals have been brought from the Cape which have nails, and it remains to be proved whether these are of the same species.

Locality, Habits, Food, &c.—This species haunts the salt pools of the sea-shores of the Cape, and lives on fish and crustaceans.

AMERICAN LUTRÆ.

Examples, *Lutra Canadensis* and *Lutra Brasiliensis.*

Lutra Canadensis, Sabine.

Description.—Fur above and below shining brown, and much resembling that of the beaver. Size much larger than that of the European Otter, *Lutra vulgaris.* Length from nose to tip of tail (which is eighteen inches) about five feet.

This is the *Loutre de Canada* of Buffon, *Land Otter* of Warden, *Common Otter* of Pennant (*Arct. Zool.*); *Lutra Brasiliensis* of Harlan; the *American Otter* of Godman; *Neekeek* of the Cree Indians; and *Capucca* of the inhabitants of Nootka.

Dr. Richardson, who gives these synonyms, states succinctly the various opinions of authors as to this species, and concludes by following Mr. Sabine's opinion that it is peculiar to the northern districts of America.

Habits, Food, &c.—In its habits and food Dr. Richardson states that the Canada otter resembles the European species. In the winter season it frequents rapids and falls for the advantage of open water; and when its usual haunts are frozen over, it will travel to a great distance through the snow in search of a rapid that has resisted the frost. When seen and pursued by the hunters as it is on these journeys, it throws itself forward on its belly and slides through the snow for several yards, leaving a deep furrow behind it. This movement is described by the Doctor as being repeated with so much rapidity, that even a [illegible] runner on snow-shoes has much trouble in overtaking it. It also doubles on its track with much cunning, and dives under the snow to elude its pursuers. When closely pressed, it will turn and defend itself obstinately. When Dr. Richardson's party were at Great Bear Lake, in the spring of 1826, these otters robbed their nets which had been set under the ice a few yards from a piece of open water. They generally carried off the heads of the fish, leaving the bodies sticking in the net.

The female brings forth one litter in the year, consisting of two or three.

Geographical Distribution.—The Mackenzie a[illegible] rivers nearly to the Arctic Sea; and Dr. Richardson [illegible] that there appears to be no difference between the [illegible] obtained on the shores of the Pacific and those in the neighbourhood of Hudson's Bay. (*Fauna Boreali-Americana.*)

Utility to Man.—The fur is valuable, and a cons[illegible] article of commerce; it varies with the season. In s[illegible] the hair is very short, and then it is almost black; [illegible]ter it becomes a rich reddish brown, with the exception of the greyish spot under the chin. The fur is nearly [illegible] as beaver-wool, but not so long, and consequently [illegible] well adapted for felt. Dr. Richardson says that se[illegible] eight thousand are annually exported to England.

Lutra Brasiliensis, Ray.

Description.—Fur short and close, of a bright red[illegible]low deepening into chestnut towards the extremity [illegible] limbs and tail; lower part of the neck and throat [illegible]low. Length, male, 3 feet 6½ inches; tail, which [illegible] thick, 18 inches. The largest female possessed [illegible] D'Azara was 34 inches long including the tail, which [illegible] inches. Another measured 36 inches, 12 for the tail.

Obs.—M. Lesson states that this is the only otter [illegible] is deprived of the glandular apparatus round the [illegible].

This is the *Lobo de rio* (River Wolf) of the [illegible] but D'Azara observes that it is not a wolf, but a[illegible] belonging to the same family as the European [illegible] from which it differs; and he accordingly calls it [illegible]. It is the *Mustela Lutra* (*Brasiliensis* β.) of Gmelin.

Habits, Food, Reproduction, &c.—D'Azara says that [illegible] species lives in troops, which sometimes, rising to the [illegible]face of the water, lift their heads and bark like dogs [illegible] a hoarse voice, in a menacing and snapping manner, [illegible] however injuring voyagers or swimmers. Each [illegible] seems to possess a separate domain. It spends as much time in the water as it does upon land, where [illegible]vours the fish which it has taken, and rears its young [illegible] holes which it excavates in the banks. The same a[illegible] we informed by the Payaguas Indians, who sail continually up and down the river, and are better acquainted with this animal than others, that the female brings forth two at a birth, covered with hair, and that many females bring forth and rear their young at the same time and in the same place, their usual resort throughout the year. The motions of this Otter are generally slow, and it drags, as it were, its belly and muzzle along the ground; when it runs it is not at all swift.

D'Azara further states that a neighbour of his purchased a young whelp, which at six months old was 34 inches long. It was permitted to run loose about the house, and was fed with fish, flesh, bread, mandioca, and other food, but it preferred fish. It would walk into the stoves and rooms, knew the people of the house, came when called by name, and would follow them like a dog, but its short legs soon tired it, and it soon grew weary. It would amuse itself with dogs and cats as well as with their masters; but it was a rough playfellow, and required to be treated cautiously, for it bit sharply. It never harmed poultry or any other animal, excepting sucking pigs, which were not safe within its reach, and it would have killed them, if it had not been prevented. It entered all the rooms and slept always below the bed, was very cleanly, and always visited one particular spot for the deposit of its excrements.

Locality.—The lakes, rivers, and rivulets of Paraguay, according to D'Azara, who at first stated that he did not believe that it entered salt water, and that its geographical range did not extend to the river Plata; but in his French [illegible] he states that the species is found in that river.

*** From M'Culloch's lists it appears that the number of Otter-skins exported from Quebec in 1808 amounted to 7000, at 1*l.* per skin. In 1826 the numbers were less, 1090 having been exported from that place in that year. In 1831, 14,863 were imported into Britain: of these 39 came from Germany, 13,104 from the British North American Colonies, 1707 from the United States, 2 from Buenos Ayres, and 11 from all other places. They were almost wholly re-exported to Germany and the Netherlands. Mr. [illegible] states that the number of Otter-skins imported into this country in 1830, was 713,115; in 1831, 494,087; in 1832, 222,393; and in 1833, only 22,536. He adds that since September 1, 1833, the duty was reduced from 1*d.* each to 1*s.* per hundred, since which he believes that the importation has gradually increased.

Enhydra.

Dr. Fleming gives the following generic character of the Sea-Otter under the above name. Six incisors above, and four below. Tail much shorter than the body. No anal appendages.

Obs.—In Cook's 'Voyage' it is stated that a young Sea-Otter was brought on board with *six lower* incisors. Steller and succeeding systematists give four as the number in the lower jaw. Dr. Richardson suggests that two of the lower ones may drop out before the animal becomes adult.

Description.—Fur thick, woolly, and very soft, with the addition of a few silky hairs of a lustrous black; most of the upper parts are of a deep velvety maroon brown, and the anterior parts silvery gray. Body elongated; tail short and stout; hinder feet very short.

This is the *Sea Beaver* of Krascheninikoff; the *Sea-Otter* of Cook, Pennant, Meares, Menzies, and Godman; the *Kaiku* of the Kamtchatdales; *Mustela Lutris* of Linnæus; *Lutra marina* of Steller, Erxleben, and Harlan; *Loutre du Kamtschatka* of the French; *Enhydra marina* of Fleming. (*Richardson.*)

Captain Cook, in his last voyage (chapter on King George's Sound, Nootka), says, 'It might have been sufficient to have observed that this animal (the sea-otter) abounds here, as it is fully described in different books, taken from the accounts of the Russian adventurers in their expeditions eastward from Kamtchatka, if there had not been a small difference in one that we saw. We for some time entertained doubts whether the many skins which the natives brought really belonged to this animal; as our only reason for being of that opinion was founded on the size, colour, and fineness of the fur; till a short while before our departure, when a *whole one*, that had been just killed, was purchased from some strangers who came to barter; and of this Mr. Webber made a drawing. It was rather young, weighing only twenty-five pounds; of a shining or glossy black colour; but many of the hairs being tipt with white gave it a greyish cast at first sight. The face, throat, and breast were of a yellowish white or very light brown colour, which in many of the skins extended the whole length of the belly. It had *six cutting teeth in each jaw; two of those of the lower jaw being very minute*, and placed without, at the base of the two middle ones. In these circumstances it seems to disagree with those found by the Russians; and also in not having the outer toes of the hind feet skirted by a membrane. There seemed also to be a greater variety in the colour of the skins than is mentioned by the describers of the Russian Sea-Otters. These changes of colour certainly take place at the different gradations of life. The very young ones had brown hair, which was coarse, with very little fur underneath; but those of the size of the entire animal, which came into our possession, and just described, had a considerable quantity of that substance, and both in that colour and state the Sea-Otters seem to remain till they have attained their full growth. After that they lose the black colour, and assume a deep brown or sooty colour; but have then a greater quantity of very fine fur, and scarcely any long hairs. Others, which we suspected to be still older, were of a chestnut brown; and a few skins were seen that had even acquired a perfectly yellow colour. The fur of these animals, as mentioned in the Russian accounts, is certainly softer and finer than that of any others we know of; and therefore the discovery of this part of the continent of North America, where so valuable an article of commerce may be met with, cannot be a matter of indifference.'

Habits, Food, Reproduction, &c.—The sea-otter haunts sea-washed rocks, lives mostly in the water, and approximates to the seals more than to the otters in its habits. The food is fish. The female brings forth on land, and notwithstanding the general marine habits of the animal, it has been occasionally seen very far from the shore.

Geographical Distribution.—The North Pacific, from Kamtchatka to the Yellow Sea on the Asiatic side, and from Alaska to California on the American coast. (*Richardson.*)

Utility to Man.—The fur was eagerly sought after, and is still prized, but not so highly as formerly. Coxe quotes Pallas for the fact that the old and middle-aged sea-otter skins were sold at Kiachta, by the Russians, to the Chinese, at from 80 to 100 roubles a skin, or from 16*l.* to 20*l.* each. Dr. Richardson observes that the trade was for a considerable period in the hands of the Russians, who, soon after the discovery of the north-west coast of America by Behring and Tschirikow, sent mercantile expeditions there. The passage above quoted from Captain Cook's 'Third Voyage' drew the attention of the English, and both private merchants and the India Company sent vessels to collect skins on the American coast and transport them to Canton. Pennant's hint at the profitable trade which might be carried on with China by a colony, were it possible to penetrate to that part of America by means of rivers and lakes, seems not to have been lost. Sir Alexander Mackenzie having traversed the continent of America and reached the Pacific, his partners in trade established fur posts in New Caledonia and a direct commerce with China; but, as Dr. Richardson remarks in conclusion, the influx of furs into that market soon reduced their price.

[illegible]

Place in the System.—Linnæus placed the Otters among the Weasels, as species of the genus *Mustela;* and modern authors generally have assigned to the form a place among the *Mustelidæ.*

In Illiger's system we find *Lutra* in his family *Gracilia* (in company with *Herpestes, Mephitis,* and *Mustela*), the fourth of his order *Falculata.*

Cuvier and Geoffroy place the form between the genus *Mephitis* (subgenus *Mydaus*) and *Canis.*

Mr. Gray arranges *Lutra,* together with *Putorius,* &c., under his subfamily *Mustelina,* the third of his family *Felidæ. Enhydra* of Fleming (which that zoologist had removed, together with *Lutra,* to his *Palmata,* so as to unite them to the Seals) forms the subfamily *Enhydrina* of Gray (which is situated between *Phocina* and *Otariina*), being the third of Mr. Gray's family *Phocidæ.*

Fischer (J. B.) places *Lutra* between *Mustela* and *Enhydris,* which last is immediately succeeded by *Phoca.*

Lesson follows Cuvier and Geoffroy.

Mr. Swainson arranges *Lutra* (with *Enhydra* as a subgenus) between *Mydaus* and *Gulo,* in his subfamily *Mustelinæ,* family *Mustelidæ.* He considers that the otters, although intimately connected with the polecats, clearly form the aquatic type of the *Mustelinæ,* and as such represent the seals.

Mr. Bell keeps *Lutra* in the family *Mustelidæ,* and in Mr. Macgillivray's *British Quadrupeds* the genus stands next to the marten.

Fossil Otters.

Jæger notices the remains of a *Lutra* in the Bean iron-ore (Bohnerz) of the Rauh Alp (tertiary); and MM. de Serres, Dubrueil, and Jean-Jean record an extinct species (*Lutra antiqua*) in the bone-caverns of Lunel-Vieil. The form was also detected in the Puy-de-Dome by MM. Croizet and Jobert.

OTTER-HOUND, a variety of hound employed in the chace of the otter. As it is necessary that otter-hounds should not only have good noses, but take the water freely, some care is necessary in attending to the breed, if a good pack is to be the result. Mr. Daniel recommends a cross between the harrier and terrier. [Otter.]

OTTERY ST. MARY. [Devonshire.]

OTTOMAN EMPIRE. [Turkey.]

OTUS, Cuvier's name for a genus of Horned Owls. [Strigidæ.]

OTWAY, THOMAS, an eminent English dramatist, was born at Trotten, in Sussex, March 3rd, 1651. He received his education at Winchester school, and was entered a commoner of Christ-Church, Oxford, in 1669. Having left the University without a degree, he went to London, where he commenced player, but met with little success on the stage. The fame which was denied to him as an actor he endeavoured to obtain as an author, and in 1675 he produced 'Alcibiades,' the first of his tragedies. In the same year his 'Don Carlos, Prince of Spain,' made its appearance, of which the popularity was so great that it is said to have been played for thirty nights in succession, and to have produced considerable emolument to the writer. 'Titus and Berenice' and the 'Cheats of Scapin' were published in 1677, the first of which was translated from Rapin, and the latter from Molière. 'Friendship in Fashion' was published during the following year.

Otway's wit procured for him the patronage of the earl of Plymouth, and a cornetcy was obtained for him by this nobleman in the army of Flanders. Not finding the military life agreeable, he gave up his commission, and returned to London, where, being in extreme poverty, he again began to write for the stage. 'The Orphan,' one of the most pleasing of all his plays, was performed in 1680, as was also the 'History and Fall of Caius Marius.' In 1681 appeared the first part of a comedy called the 'Soldier's Fortune,' which was completed by the addition of a second part under the title of 'The Atheist,' in 1684. The greatest of all his dramatic efforts however was his last, 'Venice Preserved,' which was exhibited in 1682, and which still keeps possession of the stage. Its character is altogether of a higher order than that of any of his other performances. Besides the works that have been mentioned, Otway was the author of various translations and numerous miscellaneous poems. An edition of his whole works was published in 3 vols. 12mo., in 1757; and another in 4 vols. 8vo., in 1813. His writings, although so numerous, did not secure him from the miseries of indigence; and one of the accounts of his death, which are various, represents it as having been occasioned by hunger. He died April 14th, 1685, before he had reached his 34th year. As an author, he shows great tenderness and command over the gentler feelings, and an exact knowledge of human nature. Passages of considerable power also are of frequent occurrence in his writings, which however are disfigured by a prevalent grossness and immorality. (Works, Lond., 1757, 3 vols. 12mo.; Lond., 1813, 4 vols. 8vo.)

OUDE. [Hindustan, vol. xii., p. 218.]

OUDENAARDEN, commonly called *Oudenarde,* and by the French, *Audenarde,* a fortress and town of East Flanders, 15 miles south-south-west from Ghent, on the right bank of the Schelde, in 50° 51′ N. lat. and 3° 35′ E. long. The town is a place of great trade. It is the centre of a district in which the linen manufacture is carried on, and is the market in which the products are sold; it contains also several tanneries, breweries, salt-refineries, works for dyeing and bleaching, some cotton-mills, oil-mills, and various other manufacturing establishments. The town contains 765 houses and 5407 inhabitants. It has three churches, a town-hall, an hospital, two orphan-houses, 17 schools, and a college. There is besides, a school, opened in 1833, in which 150 boys and an equal number of girls are taught gratuitously. There is also an industrial school for poor girls, in which they are taught to sew and to knit, which contains about 100 children.

The houses are generally well-built. The town is of great antiquity, but the date of its origin is quite unknown. It is believed that the Romans made it a station of importance, which is corroborated by the great number of Roman medals and coins which have from time to time been discovered on the spot. In one part of the town, where the remains of some very old buildings are to be seen, there were found statues of Domitian, Antoninus Pius, Marcus Aurelius, and Commodus. Some Flemish historians, on the other hand, date the origin of the town from the beginning of the fifth century. The prosperity of Oudenarde dates from the time of Philip of Alsace, count of Flanders, who enclosed it and gave great privileges to the citizens. A great battle took place before this town in 1708, between the French, commanded by the Duke of Burgundy, and the allies under Marlborough and Prince Eugene, in which the latter gained a complete victory.

Oudenarde is the birth-place of the learned Drusius and of Adrian Brauwer, one of the best painters of the Flemish school.

OUGHTRED, WILLIAM, an English divine and mathematician, born at Eton, in Buckinghamshire, in 1573. Cole says that he was educated at the school upon its foundation there, and was elected thence, in 1592, to King's College, Cambridge, of which, in regular course, he became a Fellow. While he was an undergraduate he invented 'an easy method of geometrical dialling,' but which was not given to the public before the year 1647. He proceeded to the degree of B.A. in the year 1596, and that of M.A. in 1599. In the year 1603 or thereabouts, Oughtred was ordained priest, and presented to the rectory of Aldbury, near Guildford in Surrey, upon which appointment he quitted the University and resided upon his living, distinguishing himself by the faithful and diligent discharge of his pastoral duties. In 1628 he was engaged by the earl of Arundel to become tutor to his son, Lord William Howard, the nobleman whose patronage of science holds a distinguished position in the history of its progress during the seventeenth century. But notwithstanding his high station in the scientific world (and Fuller says that he was 'unanimously acknowledged the prince of mathematicians'), he was in danger, in the year 1646, of a sequestration by the committee for plundered ministers, several articles having been deposed and sworn against him, material enough, it is said, to have sequestered him. But upon his day of hearing, William Lilly, the famous astrologer, applied to Sir Bulstrode Whitlocke and all his old friends, who appeared in such numbers on his behalf, that he was acquitted by the majority. Oughtred sometimes amused himself with archery; he was sprightly and active at the age of eighty, and, if we may believe Mr. Collier, died in an ecstasy of joy upon hearing of the restoration of Charles II. Fuller (*Worthies,* i. 145) says that 'this aged Simeon had a strong persuasion that before his death he should behold Christ's anointed restored to the throne, which he did accordingly to an incredible joy, and then had his *dimittis* out of this terrible life, Jan. 30th, 1660.' Evelyn, in his 'Diary' of 28th August, 1655, mentions meeting with Mr. Oughtred, 'the famous mathematician,' which shows that his fame was well established.

The following is a list of his principal works:—

1. 'Arithmeticæ in Numeris et Speciebus Institutio; quæ tum Logisticæ tum Analyticæ, atque adeo totius Mathematicæ quasi Clavis est,' 12mo., 1631.

This work passed through many editions, and an English translation of it was made by Christopher Wren, and published under the title of 'The Key of the Mathematics new forged and filed.' It was introduced by Seth Ward as a text book at Cambridge. The book was much complained of by some on account of its style, but Dr. Wallis says, 'without cause, for his words be always full, but not redundant;' and Dr. Pell, in a letter in Cavendish preserved in MS. Harl. Mus. Brit., 6796, bears witness to the same effect.

2. 'The Description and Use of the Double Horizontal Dyall, whereby not only the hower of the day is shewne, but also the meridian line is found; and most astronomical questions which may be done by the globe are resolved,' 12mo., 1636.

Another edition appeared in 1652.

3. 'A Treatise on Trigonometry,' 4to., 1657.

This book was afterwards published in Latin, in 1667, by Stokes and Haughton.

We refer for more particulars concerning Oughtred to Aubrey's 'Lives' and MS. Addit., Mus. Brit., 4221. Many of his papers are now in the valuable library of the Earl of Macclesfield.

OUISTITI. [JACCHUS.]

OUNCE. [LEOPARDS.]

OUNCE. [POUND.]

OUNDLE. [NORTHAMPTONSHIRE.]

OURAX. [CRACIDÆ, vol. viii., p. 129.]

OUREBI. [ANTELOPE, vol. ii., p. 76.]

OUSE. [YORKSHIRE.]

OUTLAWRY. This term, which is derived from the Saxon *Utlagh* or *Uthlagh*, signifies an exclusion from the benefits and protection of the law. In English law it is a punishment consequent upon a flight from justice, or a contumacious neglect or refusal to appear and answer for a civil or criminal transgression, in obedience to the process of a court of competent jurisdiction. By the laws of the Anglo-Saxons, continued after the Conquest, an outlaw, who was also called *laughlesman* (lawless man) and *frendlesman* (friendless man), lost his *liberam legem*, and had no protection from the frankpledge in the decennary in which he was sworn. A boy under twelve years of age, not being sworn to his law in the decennary, could not be outlawed; and for the same reason a woman who contumaciously refused to appear could not be outlawed, but was said to be *waived* (*derelicta*), and incurred the same penal consequences as an outlaw.

For centuries after the Conquest an outlaw was said '*Gerere* caput lupinum,' and might be lawfully killed by any one who met him. It is stated in the 'Mirror' (cap. iv., sec. 2) to have been the custom for those who slew outlaws or wolves to 'carry the heads to the chief place of the county or franchise, and there to receive a demi-mark from the county for each head, whether of an outlaw or a wolf.' The 'Mirror' is a book of doubtful antiquity and authority, and this story of the reward for the heads of outlaws is probably fabulous, or at all events an exaggeration of the fact. Bracton, who wrote about the end of the reign of Henry III., and therefore more than two centuries after the Norman Conquest, declares that an outlaw 'might be killed by all, especially if he defended himself or ran away, so that it was difficult to take him; but that when once taken, his life and death were in the king's hands; and if any man then killed him, he must answer for it as in the case of any other homicide.' (Bracton, lib. iii., cap. 13.) That this practice and law prevailed in his time is further proved by another passage in Bracton (lib. iii., c. 14), in which he says that a man who has been outlawed, but has become 'inlegatus,' or restored to his law by a pardon from the king, should take care always to 'carry his pardon about with him wheresoever he may go, and have it ready in his hand to show, lest peradventure some person, not knowing that he has obtained the king's grace, should slay him as an outlaw.' Fleta, who wrote rather later than Bracton, mentions the same law, and justifies it; 'Utlagatus et waiviata capita gerunt lupina, quæ ab omnibus impune poterunt amputari; merito enim sine lege perire debent qui secundum legem vivere recusant.' (Fleta, lib. i., cap. 27.) Lord Coke says, 'In the beginning of the reign of Edward III. it was resolved by the judges, for avoiding of inhumanity and effusion of Christian blood, that it should not be lawful for any man but the sheriff only (having lawful warrant therefore) to put to death any man outlawed, though it were for felony; and if he did, he should undergo such punishments and pains of death as if he had killed any other man; and so from thenceforth the law continued until this day.' (Co. Litt., 128 *b*.) For this fact he refers to the 'Year Book,' 2 Ass., pl. 3. The 'Year Book' however, so cited, and another report of the same case in Fitzherbert's 'Abridgement,' tit. Corone, 142, contain no such resolution, and the case from which it is obvious that Lord Coke derived the above statement, is clearly no authority to show the continuance of the old practice. A man being arraigned for homicide objects to answer, because the person with whose death he was charged had been outlawed for felony. The judges at first certainly appeared to think that it was not lawful for any one to kill an outlaw unless it were upon his resisting a bailiff who should attempt to arrest him. But after argument, they said they 'must send to the chancery to enquire if the deceased had a charter of pardon, and search their own rolls to see if his outlawry has been reversed;' and they admitted the prisoner to bail in the mean time, telling him that if they found that there had been no pardon and no reversal of the outlawry, he would not be called upon to answer. This case therefore seems to show that Lord Coke prematurely claimed for the judges in the reign of Edward III. the merit of abolishing this barbarous practice; indeed so late as the reign of Philip and Mary, Staundforde, in his 'Pleas of the Crown,' mentions the above case, and speaks of the law upon this subject as doubtful. However, though the technical quality of homicide so committed may have been questionable, there is no doubt that the practice of killing outlaws like wild beasts had ceased long before Staundforde's time.

The consequences of outlawry are the forfeiture of goods and chattels universally. Where it takes place upon a prosecution for *treason or felony*, it amounts to a conviction and attainder of the offence charged, and therefore all the outlaw's real property, as well as his personalty, is forfeited. Where it takes place upon criminal prosecutions for misdemeanors, or upon civil actions, the profits only of the defendant's lands are, during his life, forfeited to the crown. The outlaw, having neither the privilege nor protection of the law, is incapable of maintaining any action real or personal; at the common law he could not be a juror, as he was not 'liber et legalis;' and he is expressly excluded from acting as a juror by stat. 6 Geo. IV., c. 50, sec. 3.

The consequences of outlawry being so highly penal, the law has at all times been careful that no person shall be outlawed without sufficient notice of the process of the court, and without satisfactory proof of his contumacy. It is therefore required, in the first place, that in all civil cases, and in all indictments for misdemeanors, and probably also for felonies not capital, three consecutive writs of capias, each issuing upon the return of the former one, should be directed to the sheriff of the county in which the proceeding is commenced. If upon all these writs the return is non est inventus, a writ of *exigent* or *exigi facias* is sued out, which requires the sheriff to cause the defendant to be called or *exacted* in five successive county courts, or in five successive hustings, if in London; and if he renders himself, to take him. But if he does not appear at the fifth county-court or husting, judgment of outlawry is forthwith pronounced against him by the *coroners*, who are the judges for this purpose in the county-court, and by the recorder if the proceedings are in London (Co. Litt., 288 *b*; Dyer, 223 *a*, 317 *a*); and the fact of such judgment having been given is returned by the sheriff upon the exigent. Upon this return a writ of capias utlegatum may be issued into any county to arrest the defendant, and other process follows against his property. As an additional security that a man shall not be outlawed without notice of the process to which he is required to appear, the several statutes provide that a writ of proclamation shall issue at the same time with the exigent into the county where the defendant dwells, commanding the sheriff to make three proclamations of him in notorious places in the county a month before the outlawry shall take place.

The only difference between the proceedings in outlawry upon an indictment of treason or capital felony and those upon civil actions and prosecutions for inferior crimes, is that one capias is in the former case sufficient before the award of the exigent.

An outlawry may be reversed by writ of error, in which the party may avail himself of errors either of law or fact; and the slightest mistake in any part of the proceedings will avoid the outlawry. It was formerly necessary to procure a pardon from the crown, by which the outlaw was restored to his law, and became to all intents and purposes 'inlagatus.' In modern times it is the usual course for the courts to reverse outlawries upon motion, without obliging the parties to sue out writs of error or procure pardons, and by this practice justice is expedited and expense saved.

OVATION. [Triumph.]

OVERBURY, SIR THOMAS. [James I.]

OVERSEER, an officer appointed by justices of counties or boroughs, for parishes under the 43 Eliz., 2, and for townships under the 13 & 14 Car. II., 12. They cannot be less than two nor more than four for one parish or township. Churchwardens are ex-officio overseers of the poor. The duties of an overseer and of an assistant-overseer are identical, the latter being a paid officer, appointed under the 59 Geo. III., 12, where, on account of the amount of the population, the extent of the parish, or other difficulties, the services are onerous and troublesome. Before the passing of the Poor-Law Amendment Act, it was the business of an overseer as well to appropriate and distribute as to make out and collect the poor-rates. Where no select vestry existed, he was judge of the necessities of applicants for and receivers of parochial relief, an appeal in case of refusal lying before magistrates in petty sessions. For an account of the abuses which arose from the trust the law formerly confided to overseers, see the article Poor-Law. We will now describe the present duties of an overseer in parishes subjected to the operation of the Poor-Law Amendment Act: 1, Relating to the management of the poor and to the boards of guardians of the district; 2, With respect to returning lunatic and jury lists; 3, With reference to the registration of voters.

1. The Poor-Law Amendment Act limited the authority of an overseer of the poor, by transferring to a board of guardians such portion of his duties as related to ascertaining fit objects for parochial relief, the amount of relief to be given, and the manner of giving it. With such services he has now little to do. His first business on entering upon his office is to possess himself as soon as he is able of the parish books and documents, including all orders of bastardy under which money is payable; to collect outstanding arrears, if any; and to settle the balance with the outgoing overseer. He will probably be soon called upon to levy a rate, which must be made by a majority of parish-officers. On refusal by any party to pay the rate being sworn to by the overseer, a summons will be granted against the defaulter by a magistrate. An appeal may be carried by the rate-payer to the district petty sessions, on the ground of inequality, unfairness, or incorrectness, if at least seven days' notice be given to the collector or overseer under the hand of the party appellant; or to the quarter-sessions, on the ground that the property is not rateable. It is then the duty of the overseer to appear before the justices to support the validity of the rate. He must collect all arrears that he is able from the fathers of bastard children, and keep the weekly payments from them currently paid up. In cases of refusal to pay, or other difficulties, he should apply to the Board of Guardians for advice before taking the proceedings justified by law. He is only to give relief to the poor 'in any case of sudden or urgent necessity;' and, as soon as he is able, is to report to the relieving-officer his having given such relief. The relief may not be given in money, but only in articles of absolute necessity. The orders of the Poor-Law Commissioners further set forth, that 'If any overseer shall receive an order directing relief to be given to any person (duly certified, under the hand and seal of one of the signing justices, to be of his own knowledge wholly unable to work), without requiring that such person shall reside in any workhouse, he shall forthwith transmit the same to the relieving officer of his township or place, to be laid before the Board of Guardians at their next meeting.' At the end of each quarter the overseer will receive a notice from the auditor of the union to attend him, that his accounts may be examined and audited. At these times he should take with him all his parish books, letters, and papers, to any of which reference may possibly be made. He is to manage and collect the rents of parish property; and at the end of the Michaelmas quarter he should make out a 'terrier of the lands and tenements, and an inventory of stock, moneys, goods, and effects belonging to such parish or place, or given or applicable in aid of the poor-rates thereof.' The accounts of overseers must be submitted to two magistrates for their examination within fourteen days after the 25th of March. The proceedings for the election of a guardian or guardians in their district are likewise conducted for the most part by the overseer. He must distribute and affix the notices, receive the names of candidates, and, if there be a contest, circulate voting-papers, receive the votes, and return the names of the successful candidate or candidates, according to the forms of the Poor-Law Commissioners and the provisions of the 4 & 5 William IV., cap. 76. (See clauses 38-41 of the *Poor-Law Amendment Act.*)

In cases in which affiliation seems desirable, or respecting orders of removal from his parish, or notices received of orders of removal to it, the overseer should hear the opinion of the Board of Guardians at their next ensuing meeting. He will likewise receive instructions, if he is ignorant or doubtful of the forms which must be complied with in such cases.

2. At their first petty-sessions after the 15th of August, the justices of the district issue their warrants to the overseers to return lists of all insane persons chargeable in their respective parishes. It is the duty of the overseer to make this return, as well as, in the case of any insane person becoming chargeable, to give notice within seven days to some magistrate acting for that division of the county. In July he will receive from the high-constable of the division a precept, containing full information of his duty respecting the return of a list of persons liable to serve on juries. This return is to be made before the 1st of September.

3. With regard to registration, his business is as follows. On the 20th of June in each year, he will affix on the church door a notice, directing fresh claimants for votes to make formal claim in writing to the overseer on or before the 20th of July. His next step is to make out for each parish an alphabetical list of the names of all persons already in the register, together with those of all claimants. This list must be completed by the last day of July, and affixed on the church or chapel, and, if there be no church or chapel, in some conspicuous situation, on the two first Sundays in August. He must give copies of this list for a reasonable payment, if required. On or before the 25th of August, objections to votes may be received. An alphabetical list of objections is to be posted, as before, on the two Sundays next preceding the 15th of September. When the revising barrister holds his court, it will be the duty of the overseer to attend. His expenses arising from his duties connected with registration are defrayed from the poor-rate. So far with regard to registration of county voters. Overseers of a parish situated in a borough, by the last day of July, without any claims being made, must make an alphabetical list of persons having a 10*l.* qualification in respect of premises situated in their parish. A similar list of freemen must be made where freemen are entitled to votes. These lists must be fixed as above. Claims from persons omitted and objections are received on or before the 25th of August, and lists of these claims, &c. are to be posted on the two Sundays next preceding the 15th of September. The forms according to which overseers are to frame their notices are to be found in the acts of parliament whence their obligations arise, and are collected in a useful pamphlet, from which this article has been compiled, entitled 'The Duties of Overseers of the Poor,' by George Dudgeon, London.

OVERTURE (*Ouverture*, Fr.), a musical composition for a full instrumental band, introductory to an oratorio, opera, or ballet; a kind of musical prologue, and, as such, ought to be in good keeping with the piece which it ushers in; though in most instances but little attention has been paid to the character of this important feature of the melodrama. There are some exceptions however, and it would be unjust to the memory of three most intellectual composers not to mention, as instances of deep thought and poetical imagination, the fine overtures to *Don Giovanni*, *The Freischutz*, and *A Midsummer-Night's Dream*, all of which fully prepare the mind—in so far as inarticulate sounds can prepare it—for the romantic stories and su-preternatural agency on which the following scenes are founded.

The overture originated with Lully [Lulli], whose compositions supplied many of the early Italian operas with an opening instrumental piece. And indeed the great Handel himself imitated to a certain extent the overtures of the French composer; though in this case, as in every other of the kind, he improved whatever he touched.

OVERYSSEL, a province of the kingdom of the Netherlands, is situated between 52° 6' and 52° 52' N. lat., and between 5° 50' and 7° 5' E. long. The area is 1250 square miles, or about that of the county of Glamorganshire. It is bounded on the north by Friesland and Drenthe, on the east by the kingdom of Hanover and the Prussian province of Westphalia, on the south by Guelderland, and on the west by Guelderland and the Zuyder Zee. It is a low level country, containing a few hills, which the inhabitants call mountains. The soil is wet and marshy, especially in the western part, where the peat moors of Eelaer and Hardenberg extend between Ryssen, Hardenberg, and Ootmarsum. There are likewise several sandy heaths, but near the Yssel there is some rich corn land. The chief river is the Yssel, which runs along the frontier of Guelderland, and is 300 feet in breadth; it is joined at Deventer by the Schipbeek, and falls into the Zuyder Zee below Kampen; other rivers are the Zwarte Water (i.e. Blackwater), the Vechte, and the Linde. A canal, called the Willemsvaart, which unites the Yssel and the Zwarte Water, was opened in 1819. The province contains several small lakes. The climate is moist, and, on account of the extensive marshes, unhealthy. The products are some corn, flax, rapeseed, pulse, potatoes, garden fruits, plums in great abundance, and some wood, especially oak and alder. There are the common domestic animals, poultry, small game, great numbers of wild geese, fish, and bees. The inhabitants derive their chief subsistence from the breeding of cattle and by digging peat. Agriculture is of secondary importance, except in some few spots on the Yssel. The pastures being very rich, especially in the western parts of the province, the cattle attain a great size. The sheep, which are numerous, are of a small breed, and their wool is coarse. The breed has however been improved by the introduction of merinos. The horses are nearly equal to those of Guelderland. Considerable profit is derived from the breeding of bees and the fisheries. The manufactures are linen, woollens, cotton, (especially printing paper and common writing-paper); there are iron-works at Deventer. The bleaching of linen is pretty extensively carried on. The articles of exportation are cattle, butter, cheese, wool, plums, honey, wax, linen, basket-work, oak bark, and paper. In proportion to its extent, this is the least populous province in the kingdom; the number of the inhabitants is 161,166, who are mostly Calvinists; there are however many Roman Catholics, some Baptists, and a few Lutherans.

The province is divided into three districts, those of Zwoll, Almelo, and Deventer, so named after the chief towns. Zwoll, the capital of the province, is a well built town on the Zwarte Water, a short league from the Yssel, and rather farther from the Vechte, with which it has a communication by means of the Willemsvaart above mentioned. It is defended by a rampart, which is planted with rows of trees, and by very strong outworks. It has three gates, leading to as many suburbs, eight churches, a house of correction, and a Latin school. The inhabitants, between 14,000 and 15,000, carry on a considerable trade. There are numerous tanneries, fourteen manufactories of cordage, two paper-manufactories, one of snuff and tobacco, and extensive bleaching-grounds.

Deventer is on the right bank of the Yssel, over which there is a bridge of boats, and which here receives the Schipbeek, which runs through the town. It is a fortified town, but the works have fallen into decay. There are seven churches, the principal of which has some fine paintings on glass. There is a gymnasium and other public institutions. The manufactures are linen, carpets, and stockings, of which the poorhouse supplies 20,000 pairs annually; tobacco, and cordage; many of the inhabitants follow the occupations of tanners, sugar-refiners, salt-boilers, soap-boilers, iron-founders, and brewers. Deventer is famous for a kind of gingerbread, the composition of which is said to be a secret, and which is annually exported to the value of [illegible]. The trade of Deventer is very considerable. The exports are corn of all kinds, linen and bacon, tobacco, wine, cheese (a million pounds in a year), oil, sugar, chicory, as a substitute for coffee, wool, vinegar, and rum. The population is now (1840) above 14,000. Deventer is the birth-place of the learned James Gronovius. Thomas à Kempis taught and died in this town.'

Almelo, on the Vechte, has 2400 inhabitants, among whom there are many Baptists; they manufacture woollens and linen; of the latter 14,000 pieces are annually exported. Other towns in this province are Enschede, 2500 inhabitants, and its district Lonneker, with 6000 inhabitants; the manufactures of which are worth a million of florins annually. Hasselt, 1500 inhabitants; Steenwyck, 2300 inhabitants; Borne, 3200 inhabitants, and Hengelo, 2500 inhabitants, both of them flourishing manufacturing towns. (Hassel; Hörschelmann; Cannabich.)

OVIBOS. [Ox.]

OVIDIUS, PUBLIUS NASO, was born at Sulmo in the country of the Peligni, B.C. 43, the same year in which Cicero was murdered, and on the very day on which the consuls Hirtius and Pansa died. The events of his life are chiefly known from his own writings, and more particularly from the 10th elegy of the 4th book of the 'Tristia.' Ovid was of an equestrian family. He had a brother exactly twelve months older than himself; the two brothers were sent to Rome for their education at an early age. From his boyhood Ovid was fond of writing verses, and, as he says of himself,

'Sponte sua carmen numeros veniebat ad aptos,
Et quod tentabam scribere versus erat.'

His father discouraged his poetic aspirations on the ground that poverty was the condition of poets, and the youth accordingly tried to prepare himself for the career of the bar. The two brothers were educated under the care of some of the best teachers then in Rome—Plotius Gryphus, whom Quintilian (*Inst. Or.*, ii. 4) considered one of the first teachers of eloquence, Arellius Fuscus, the friend of Horace, Messala, and Porcius Latro, the friend and companion of Seneca. Seneca says that he had seen Ovid practising declamation before Fuscus. His brother Lucius died after completing his twentieth year, an event which Ovid most affectionately lamented. On attaining the suitable age, Ovid discharged the office of one of the Triumviri, and other public duties subsequently. He also acted as one of the court of the Centumviri, and on several occasions as a judex. (*Trist.*, ii.) But neither his bodily strength nor his disposition was suited to public or active life; poetry was his delight, and he resolved to dedicate himself to it. He accordingly sought the society of the contemporary poets whose names he has himself recorded. He was acquainted with Macer, Propertius, Ponticus, Bassus, and Horace, who was about twenty-two years older. He only just saw Virgil and Tibullus, both of whom died B.C. 19. He was married to his first wife when he was very young. The match was not a suitable one, and the wife was soon divorced. A second wife was in like manner put away, though the poet had no serious charge to make against her. Ovid's amours with Corinna, whom he celebrates under that fictitious name, and with other women, may have tended to interrupt his conjugal felicity. However this may be, he ventured to take a third wife, with whom he lived happily to the time of his exile. He had a daughter, probably by his third wife; the daughter was twice married. His father died at the advanced age of ninety, and his mother shortly after; but neither of them lived to see their son's disgrace and exile.

Ovid spent an easy life at Rome in the enjoyment of the society of his contemporary poets and friends, Atticus, Pedo Albinovanus, Tuticanus, and others already enumerated, and in the possession of a competent income. He visited Asia and Sicily, but it does not appear at what period of his life (*Ex Pont.*, ii., Ep. 10); probably when he was a young man. His residence at Rome was near the Capitol (*Trist.*, i., El. 3), and he had some gardens near the junction of the Flaminian and Claudian roads; he had also a patrimony in the country of the Peligni. Ovid was intimately acquainted with the family of Augustus Cæsar; and an 'Epicedion on the death of Drusus' (B.C. 9), addressed to his mother Livia, which is still extant, is attributed to him. Among his various poetical works which were written and published before his exile, his three books 'Artis Amatoriæ,' appeared in the year 2 B.C., the same year in which Augustus banished his daughter Julia. Previous to the 'Ars Amatoria' he had published his three books of 'Amores,' which were originally in five books; and also his 'Heroides.'

At the close of the year A.D. 8, when he had just completed his fiftieth year, he was banished from Rome by Augustus. The sentence was altogether unexpected; it fell on the astonished poet like a thunderbolt. The place of his exile was Tomi, a Milesian colony (*Trist.*, iii., El. 9) in the country of the Getæ, on the banks of the Euxine. Ovid has described in a most touching manner (*Trist.*, i., El. 3) the last night which he spent in Rome, and his eternal separation from his wife and friends; his daughter was absent in Libya. His property was not confiscated, but his exile was for life. The cause of the banishment of Ovid is not distinctly stated by himself, nor by any other writer; a circumstance which has led to various conjectures, all of which however are devoid of any historical foundation. The supposition that Ovid was banished for an amour with the emperor's daughter Julia rests on no evidence, and is inconsistent with the fact that Julia was banished ten years before Ovid. He admits (*Trist.*, v., El. 11) that his offence deserved a severer punishment than the emperor inflicted. His sentence was not Exsilium, but Relegatio; and the difference was not unimportant. Exsilium was followed by loss of fortune and citizenship; Relegatio was not followed by loss of citizenship, and only accompanied with loss of property so far as such loss was comprehended in the sentence of Relegatio. The poet himself has expressed this with strict technical accuracy in one of his elegies addressed to his wife, in which he tells her that she cannot be truly upbraided as being the wife of an exile, inasmuch as his sentence was only Relegatio:

> 'Nec vitam, nec opes, nec jus mihi civis ademit;
> Qui merui vitio perdere cuncta meo.
> Sed quia peccato facinus non affuit illi,
> Nil nisi me patriis jussit abire focis.'
> *Trist.*, v., El. 11.

In other passages however (*Trist.*, iii., El. 3, &c.) he calls himself Exsul, but doubtless in the general sense of that term; for Relegatio was one of the species of which Exsilium was the genus.

He admits (*Trist.*, ii. 207) that there were two charges against him, the character of his amatory verses and some fault (error) which he never mentions. The whole of the second book of the 'Tristia,' which is addressed to Augustus, is an apology for his erotic poetry, and he complains that though written long before the date of his banishment, it was made the ground or pretext of his punishment:

> 'Nos quoque jam pridem scripto peccavimus uno:
> Supplicium patitur non nova culpa novum.'
> *Trist.*, ii. 539.

In various other passages (*Trist.*, iii., El. 14; iv., El. 1; v., El. 1; 'Ep. ex Ponto,' i. 1, &c.) he refers to his poetry as one cause of his misfortunes. It may be conjectured that he was punished under the provisions of the Julian Law, De Adulteriis coercendis (*Dig.*, 48, tit. v.), which was passed about B.C. 17; for though the provisions of this law, as known to us, make no mention of obscene poetry, it is clear from the title in the 'Digest' that the law extended beyond punishing the direct parties to an act of adultery, for it punished, among others, those who lent their houses for adulterous purposes. Ovid himself says, that of the two charges brought against him, one should be nameless, but the other was founded on his amatory poetry as encouraging to adultery:

> 'Altera pars superest qua turpi crimine tactus,
> Arguor obsceni doctor adulterii.'
> *Trist.*, ii. 211.

At the time of his banishment the fifteen books of the 'Metamorphoses' were unfinished (*Trist.*, i., El. 1; ii., 555; iii., El. 14); the poet had burned them, as being incomplete, at the time of his leaving Rome, but there were other copies in existence. The twelve books of the 'Fasti,' of which the first six only have been preserved, were also written before his exile, and, as the poet tells us, inscribed to Augustus Cæsar. They were finished during his exile, and, as we now have them, inscribed to Cæsar Germanicus.

The works of Ovid written during his banishment are, the five books of the 'Tristia,' and the four books of his 'Letters from Pontus:' the letters are addressed to his wife, to Maximus, Pedo Albinovanus, Græcinus, Rufinus, and others of his friends. The 'Ibis' also was written in his banishment, and apparently soon after his arrival at Tomi.

Notwithstanding the most abject entreaties of the poet and the interest of his friends, Augustus never recalled him from banishment. He died at Tomi, A.D. 18, in the sixtieth year of his age and the tenth of his banishment. Augustus died four years before him. The circumstance of his not being recalled by Tiberius renders it probable, as has been conjectured, that he had incurred the anger of Livia Augusta. The poet, who had enjoyed all the pleasures of a luxurious capital and the society of all his most distinguished contemporaries, spent the last years of his life among a barbarous people and in an inhospitable climate, worn out with grief and mental anxiety (*Ex Ponto*, i., Ep. 4). His only consolation in exile was to address his wife and absent friends, and his letters were all poetical. The Muses, who were the cause of his calamity, were also his consolation in misfortune. Though the 'Tristia' and the 'Letters from Pontus' have no other topic than the poet's sorrows, his exquisite taste and fruitful invention have redeemed them from the imputation of being tedious, and they are read with pleasure and even with sympathy.

It shows the versatility of his talent that he wrote a poem during his exile in the Getic language; the subject was, the praises of Augustus Cæsar and his family. The rude barbarians to whom Ovid recited this poem were surprised and delighted: their uncivilised minds acknowledged the power of 'immortal verse.' They applauded and anticipated the poet's recall; but the stern master of the Roman world was inexorable. (*Ex Ponto*, iv., Ep. 13.)

The works of Ovid form one of the most valuable parts of the literature of Rome. With the exception of the 'Metamorphoses,' they are all written in the elegiac measure, the restraint of which would have been ill suited to such long compositions as the 'Fasti,' in the hands of almost any other Roman poet. But Ovid was a perfect master of the technical part of poetry, and it is surprising with what consummate skill he has contrived to include in each consecutive pair of verses a full and complete sense. It is rarely necessary to go beyond each pair of verses in order to obtain the meaning of the poet; each couplet is generally complete in itself. And yet the whole of a long poem written in this measure is so artfully and skilfully combined, that it exhibits a faultless unity. It is a necessary consequence however of this restraint, that the elegiac poems of Ovid are sometimes expressed with such an epigrammatic brevity as to be obscure; and the antithesis, which seems to be in some measure inseparable from this kind of measure, and certainly was rather sought after than avoided by the poet, is sometimes too frequent.

If we estimate the character of Ovid by his erotic poetry, we must admit that he is without excuse. The pleasure of the sex seems to have been the uppermost thought of his mind, and the tendency of his 'Amores' and 'Ars Amatoria' must be considered injurious to the morals of a people. The 'Remedia Amoris' can hardly be viewed, as some are inclined to view it, as a kind of Palinodia, or recantation of his amatory poetry. If we estimate the character of the poet by that of the licentious age in which he lived, we shall judge him more favourably: though a man of pleasure, he was temperate in eating and drinking, humane, and generally beloved.

There are no passages in the extant works of Ovid which approach the gross obscenity of many passages in Catullus, Horace, and other Roman writers; and this is a merit, at least viewed as a matter of taste. In a moral point of view his poetry may be more dangerous. The voluptuous pictures of Ovid are only covered with a transparent veil; and even this is sometimes withdrawn. It is rather singular that the 'Heroides,' which abound in obscure allusions and in voluptuous imagery, and are often difficult to understand, should have been so much used as an elementary schoolbook in modern times.

The two great works of Ovid are his 'Metamorphoses' and his 'Fasti.' The subject of the 'Metamorphoses' is briefly expressed in the opening of the first book:—

> 'In nova fert animus mutatas dicere formas
> Corpora. Di cœptis (nam vos mutastis et illas)
> Adspirate meis, primaque ab origine mundi
> Ad mea perpetuum deducite tempora carmen.'

The rich mythology of Greece furnished Ovid, as it may still furnish the poet, the painter, and the sculptor, with materials for his art. With exquisite taste, simplicity, and pathos, he has narrated the fabulous traditions of early ages, and given to them that appearance of reality which only a master hand could impart. His pictures of nature are striking and true; he selects with care that which is appropriate; he rejects the superfluous; and when he has completed his work, it is neither defective nor redundant.

The art of the rhetorician, as well as that of the poet, is perceptible in all the works of Ovid, but particularly in the 'Metamorphoses.' The two speeches of Ajax and Ulysses, in the beginning of the thirteenth book, are in their kind models of oratory. He who could write the speech of Ulysses, might himself have become an orator, and if he had lived in the age of Hortensius and Cicero, might have thriven, as Ulysses did:—

———————— quid facundia posset.

The 'Metamorphoses' are read with pleasure by youth, and are re-read in more advanced age with still greater delight. The poet ventured to predict that his poem would survive him, and be read wherever the Roman name was known.

The '*Fasti*' of Ovid are in fact a valuable historical monument. He has preserved to us the Roman calendar, with all the antient stories attached to it, collected from the traditions of the people and the old chroniclers and antiquaries. His own explanations may often be of little value, but they are easily separated from the antient story or tradition which he relates. He begins with January, and following the days of the month in order, he assigns to each its appropriate festival or solemnities. It shows no small skill in a poet to convert the Calendar of his country into a pleasing and instructive poem, rich in historical facts, and enlivened and relieved by true poetry. A complete commentary on the 'Fasti' would be a valuable commentary on Roman history. The last six books are unfortunately lost.

Ovid wrote also one tragedy at least, the 'Medea' (*Trist.*, ii.) which is highly spoken of by Quintilian (*Inst. Or.*, x. 1), and by Tacitus (*De Orat. Dialog.*, 12).

There are various other small poems attributed to him, perhaps without good reason.

The editions of the collected and separate poems of Ovid are numerous. The best edition of his complete works is by Burmann, 4 vols. 4to., Amsterdam, 1727. The French translations of the various poems, which are very numerous, are mentioned at the end of a long article on Ovid in the 'Biographie Universelle.' There are numerous English translations:—

The best translation of Ovid into English verse is 'Ovid's Metamorphoses, in Fifteen Books, translated by the most Eminent Hands,' London, 1717, fol. There have been numerous reprints of this version. The translators were, Dryden, Addison, Congreve, Rowe, Gay, Ambrose Philips, Garth, Croxall, and Sewell. Sandys translated the first five books, Lond. 1627, fol.; and separate books have been translated by others. There is a literal prose translation by Clarke, London, 1735, 8vo.; and there is another prose translation, London, 1748. There are many translations of the 'Art of Love,' one by Dryden, Congreve, &c., as well as of the 'Heroical Epistles,' one by Quarles, Lond. 1673, 8vo.; and there are translations in verse or prose, or both, of the 'Fasti' and the other works.

It is hardly necessary to remark that a translation of Ovid into English can have little value. A great part of his merit consists in his language; and it is impossible to render the meaning of the original, except by periphrasis and paraphrase, which hardly convey the meaning, and most certainly destroy the beauty of that which is a work of consummate art.

OVIE'DO, a town in Spain and the capital of the province called Asturias, is situated in a plain at the confluence of two little rivers, Ovia or Ove and Nora, the former of which runs into the Nora, and the Nora into the Nalon, another inconsiderable stream in the neighbourhood. The origin of Oviedo is generally assigned to Fruela I., grandson of Pelayo, who is supposed to have built it in A.D. 757, soon after his accession to the throne of Asturias. According to other authorities, Oviedo was a considerable town before the time of that sovereign, who is said only to have made it the capital of his new conquests from the Moors. In either case, it is more than probable that Oviedo was so called from the river Ovia, or Ove, near to which that town stands. During the middle ages Oviedo was known throughout Christendom as the City of the Bishops ('Civitas Episcoporum'), owing, we are told, to the great number of dignitaries of the church who, being persecuted and exiled by the Mohammedan conquerors, took refuge in this place. Oviedo was formerly the seat of a bishop, but a council having been held there in 901, the bishopric was by the Pope converted into an archbishopric. This dignity however was in the course of time transferred to the church of Santiago, and Oviedo became a bishopric as before.

Oviedo contains an episcopal palace, three parishes, a cathedral, and a collegiate church: it had also three convents of monks and three of nuns, besides four hospitals. The university, one of the finest buildings in the town, is well endowed, and contains a numerous and select library. The cathedral, which is also supposed to be the foundation of Fruela in 760, is a magnificent structure of the pure Gothic style, equalled perhaps by none in the Peninsula. It once contained a rich treasury of valuable vases, relics, and other ornaments, but these were almost entirely lost during the French war. The remains of fourteen kings and queens of Asturias are deposited in one of the chapels. There is also in the town another very fine church, San Salvador, built by King Silo in 774. The streets are tolerably straight, regular, and well paved. The principal square, where the market is held, is handsome and large. There are some public walks, ornamented with fountains and trees, the principal being that called 'El Chambul.' The town is provided with good water by a very sumptuous aqueduct of forty-one arches, entirely built of freestone. Oviedo has little or no commerce, like most of the inland towns in Spain, owing to the total want of roads. It has a few tanyards, two manufactories of woollen hats, horn combs, buttons for the use of the peasantry, and some coarse linen-stuffs. There is also a manufacture of arms, supported by the government, but the works have of late been suspended.

The population of Oviedo in 1827, the epoch of the last census, was 10,476. It is the birth-place of the celebrated Feijoo, the author of the 'Teatro Critico,' Madrid, 1777; of the bishop Don Pelayo, who lived in the time of Fernando el Magno, and left a chronicle of Spain and a genealogy of the kings of Asturias; of Luis Fernandez de Oviedo, the author of many excellent works on medicine and botany; and lastly, of the celebrated Marina, the author of the 'Teoria de las Cortes,' Madrid, 1822. Oviedo is 47 miles north of Leon, 43° 19′ N. lat., 5° 57′ W. long.

(Miñano; Florez, *España Sagrada*, Madrid, 1754; Ponz.)

OVIE'DO Y VALDE'S, GONZALO FERNANDEZ DE, one of the earliest historians of the New World, was born at Madrid in 1478. Being of noble Asturian descent, he was, at the age of twelve, introduced into the royal palace as one of the pages of Prince John of Castile, the son of Ferdinand and Isabella. He continued with the court several years, and was present, though a boy, at the closing campaigns of the Moorish war which preceded the surrender of Granada (1490-92). In 1514, according to his own statement, he embarked for the West Indies, where, although he revisited his native country several times, he continued during the remainder of his life. Oviedo occupied several important posts under the government: he was made governor of the fort and harbour of Santo Domingo in the island of Hispaniola or Hayti, and captain of a company of infantry. Charles V. appointed him also to an office of a literary nature, for which he was highly qualified by his vast learning and his long residence in the New World, that of historiographer of the Indies. It was in this capacity that he produced his principal work, 'Historia General de las Indias,' in fifty books, twenty of which, making the first part, were printed for the first time at Seville in 1535, fol.;* reprinted at Salamanca in 1547, fol.; and lastly, at Valladolid in 1557. It was translated into French by Jean Poleur, and published at Paris in 1556, fol. A summary of this work is also inserted in Barcia's collection of the 'Historiadores Primitivos de las Indias Occidentales,' Madrid, 1749, fol. Oviedo wrote likewise 'Tratado de la Natural Historia de las Indias,' Toledo, 1526, besides two tracts respecting the 'Palo de Guayacan' (the Guayacum officinale of Linnæus) and the 'Palo Santo' (Lignum vitæ), which are translated into Latin in the first volume of the collection, 'Scriptorum de Morbo Gallico.' But the work for which Oviedo is justly celebrated, though known only to a few scholars, is his 'Quinquagenas,' so entitled from its consisting of fifty dialogues, in which the author is the chief interlocutor. This interesting production contains a very full notice of the principal persons in Spain, their lineage, revenues, and arms, with an inexhaustible fund of private anecdote, all which renders it a most valuable addition to the history of that time. This work however still remains in manuscript, in three folio volumes, in the national library of Madrid, and it is only through the extracts of Navarrete that we are enabled to estimate its contents. Oviedo has been accused of treating the Indians employed in the gold-mines with unjustifiable cruelty. His 'History of India' too has been denounced by no less an authority than Las Casas as a wholesale fabrication, 'as full of lies almost as pages;' but there can be no doubt that, though somewhat loose and rambling, he possessed extensive stores of information, by which those who have followed him have greatly profited.

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* A copy of this scarce edition, with the author's signature appended to it, which belonged once to Sir Joseph Banks, is in the British Museum.

The time of Oviedo's death is uncertain, but he must have lived to a considerable age: he was still alive in December, 1556, since the original manuscript above alluded to, preserved in the library at Madrid, is signed by him at the age of 79.

(Navarrete, *Coleccion de Viages y Descubrimientos*, Madrid, 1825 29; Prescott, *History of the Reign of Ferdinand and Isabella*, vol. i.; Muñoz, *Historia del Nuevo Mundo*, Madrid, 1793; Pinelo, *Epitome de la Biblioteca Oriental*, Madrid, 1737.)

OVI'PAROUS. An animal is said to be oviparous when the ovum, or egg, is excluded from the body entire and hatched after such exclusion. Birds and the great majority of reptiles are oviparous animals.

OVIS [SHEEP]

OVOVIVI'PAROUS. An animal is said to be ovoviviparous when the egg is hatched within the body and the young one is excluded alive. Thus, among the *Reptiles*, the young of the Lizard known by the name of *Zootoca vivipara*, the *Viper*, the *Rattlesnake*, and the *Blindworm*, are hatched before they are excluded from the body, and not long before such exclusion: indeed it is probable that the rupture of the egg takes place during the parturition. The Monotremes (*Echidna* and *Ornithorhynchus*) and the *Marsupialia* are examples of ovoviviparous mammiferous quadrupeds.

OVULE, in Botany, is the unimpregnated seed. It originates from a succulent cellular space called the placenta [PLACENTA], in the inside of the seed-vessel, and may be described as a cellular cone or nucleus, enclosed within one or two coats, which are perforated at the apex of the cone. The latter contains a minute sac, called the sac of the amnios, in which the embryo appears after the process of impregnation has taken place. The examination of monstrous formations renders it probable that the ovule, morphologically considered, is a bud; but this doctrine is not universally admitted, and requires confirmation. The modifications of the ovule consist chiefly in an inversion of its parts, and in a loss of one of its membranous coatings, the details of which are suited only to special introductions to botany. An account of them will be found in Lindley's *Introduction to Botany*, 3rd edition, p. 211.

OVULITES. [OPERCULIFERA.]

O'VULUM. (Malacology.) [CYPRÆIDÆ, vol. viii., p. 257, et seq.]

OWEN, JOHN. [THEOLOGY.]

OWEN, W [BIBLE SOCIETY]

OWHYHEE. [SANDWICH ISLANDS.]

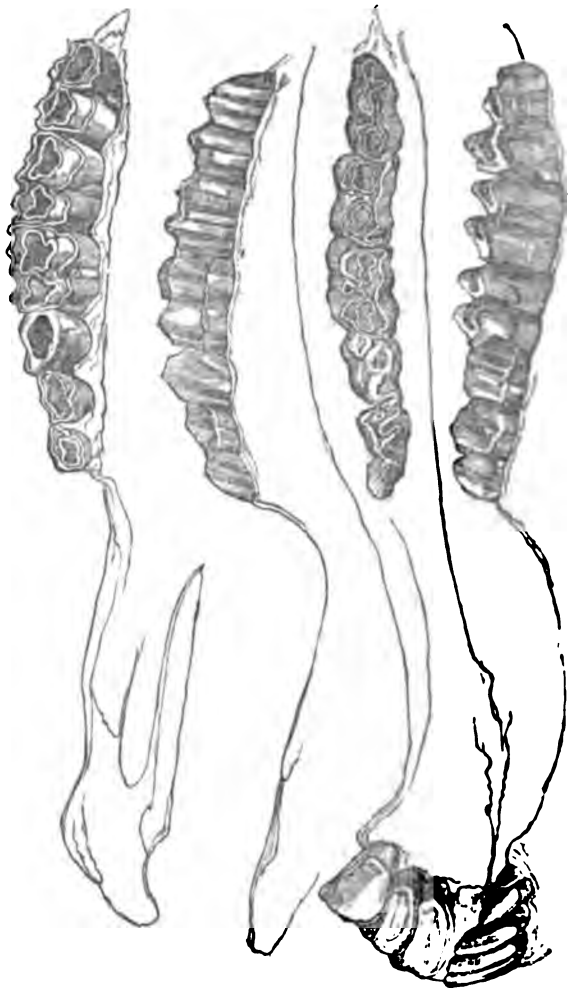
OWLS. [STRIGIDÆ.]

OX. The genus *Bos* of Linnæus consists of those ruminants only which are familiarly known as *Oxen*; and though at the conclusion of this article we shall endeavour to give a sketch of the family *Bovidæ*, according to the views of more modern zoologists, it will treat mainly of *Oxen* only, or the forms comprised under the Linnean genus above named, and the genus *Ovibos* of De Blainville.

ORGANIZATION.

Skeleton; *Skull*.—The front, or forehead, is wide and flattened; the lacrymal bone is enlarged below and leaves no open space between it and the nasal bone. The upper occipital and parietal bones unite at so early a period into a single bone, that the calf almost at its birth has them already in the confluent state; but in the earlier stages of the fœtus, the two parietal and the two interparietal bones are distinguishable. The occipital suture remains strong below the occipital crest, and so differs from the other ruminants; and the frontal suture reaches up to this crest, thus forming the principal character of the physiognomy of the ox. The hole analogous to the sphæno-palatine aperture is enormous and is hidden in the sunken space behind the orbital or supermolar prominence of the maxillary bone; at its superior border a small portion only of the vomer is perceptible. The tympanic cavities terminate in long sharp points, and between them the basilary bone presents two strong prominences. The temporal ala of the anterior sphenoid bone, which in the antelopes and stags has the crest but slightly projecting, has in the Oxen a strong and sharp projection.

Dental Formula:—Incisors $\frac{0}{8}$; canines 0; molars $\frac{6-6}{6-6} = 32$.



Teeth of Ox.

(See the figures of skulls of Oxen in the article BISON* and those of the *Bos Caffer* and *Bos primigenius* below.)

The rest of the skeleton is much like that of the other ruminants, and the following cuts will give a better idea than words of the construction of the extremities.

The anterior angle of the spine of the scapula is prolonged, as in the camels, into an acromial apophysis, and the spinal border is rounded; moreover in the Ox the base of the spine towards the neck of the bone is blended with the anterior border. In the pelvis of the ruminants generally the spinal angle of the ossa ilii is wider and placed more backwards than the external angle, the truncation of which is oblique and nearly continuous to the anterior border of the bone. The pelvis of the Ox may thus be easily distinguished from that of the horse, which has its spinal angle pointed and as forward as the external angle, which last is more truncated, so as to be nearly square. The ischium of the Ox, moreover, is much more elevated above the cotyloid cavity, the ischial tuberosity is truncated so as to present three angles, and the posterior edge of the pelvis

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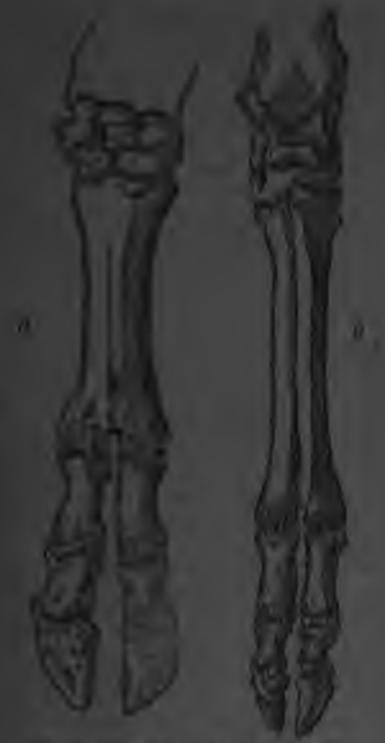
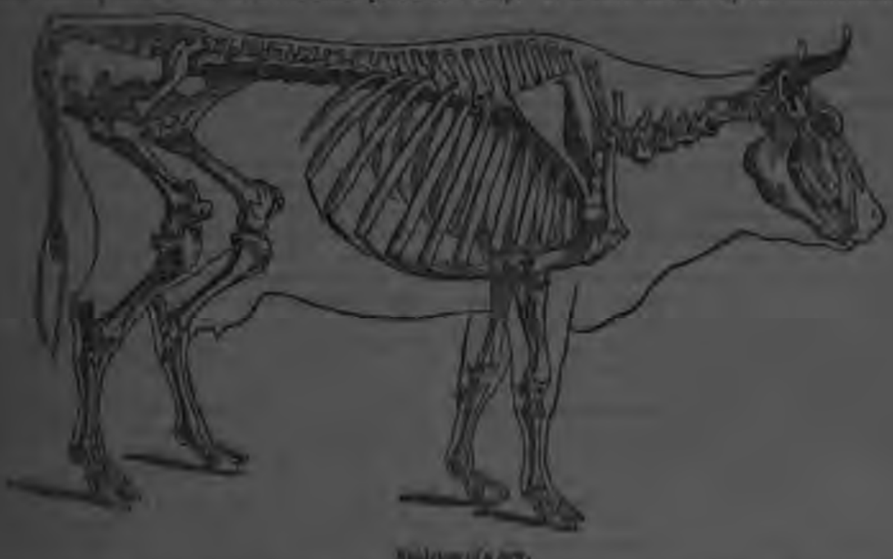
* In the article BISON, vol. iv., p. 462, left hand column, and last line of the third paragraph of the note, for 'anum' read 'unum.'



a, Fore foot of ox; b, hind foot of the same.

forms a well marked re-entering angle, whilst in the horse the same part is nearly rectilinear. Our limits do not permit a more detailed description, and indeed the other points in which the skeleton of the ox differs from other ruminants are principally those of size and proportional length and thickness. The annexed cut will convey a general idea of the entire construction, and the several bones are within the reach of most of those who would wish to examine the parts in detail.

Organs of Digestion.—The number and disposition of the teeth will be found at p. 74; and the digestive canal may be well studied by examining the following preparations in the Museum of the Royal College of Surgeons (*Physiological Series*). No. 555 exhibits the stomach and small intestines of a fœtal calf (*Bos Taurus*, Linn.). The rumen is laid open, showing its communication with the œsophagus and the reticulum, and the several compartments into which it is divided: the two larger occupy the upper part of the paunch; the two smaller form sacculi visible externally at the lower part of the paunch; the latter appear to be analogous to the cardiac sacculi of the Peccary and Kangaroo, but are both lined with cuticle. The reticulum, or honey-comb bag, is laid open, so as to exhibit the large aperture of communication with the preceding cavity, and the groove, or canal, leading from the œsophagus to the psalterium or plicated cavity. It is along this canal that the re-masticated food is conveyed to the psalterium, the muscular walls of the groove shutting out the reticulum equally with the rumen. A black bristle is passed through this communication, and the psalterium laid open, showing the laminæ within it, and the opening into the abomasum, which is left entire. No. 556 consists of portions of the four cavities of the stomach of a calf, exhibiting their manner of communication with each other and with the œsophagus, more especially the canal which leads from the œsophagus to the psalterium, and the muscular sphincter surrounding it. This sphincter is endowed with a peculiar irritability, which occasions it to contract upon the deglutition which follows rumination, and to dilate when food is swallowed after having undergone the first mastication only. It is obvious that by the contraction of this sphincter the re-masticated food is in great measure prevented from entering either the rumen or reticulum, but must pass directly into the third cavity, the orifice of which is by the same act drawn up towards the œsophagus to receive it. The villi of the rumen are very short and pointed. The cells of the reticulum and the laminæ of the psalterium are also beset with villi. The vascular lining of the abomasum is seen to be thrown into broad rugæ, in the small portion of the cavity which is preserved in the preparation. No. 559 is the portion of the rumen of an Ox. The villi are still more flattened in shape than they are in the sheep, and are pointed at the extremity (whereas those in the sheep are dilated), except near the reticulum, where they assume the form of laminæ with irregular jagged margins. No. 560 presents a small portion of the American Bison, in which the villi are much longer, coarser, and of a darker colour. In No. 563, A, a portion of the reticulum of an Ox is shown, where the cells are seen chiefly disposed between broad parallel septa, and the larger cells, formed by the narrower transverse septa, are again divided into smaller cells. No. 564, B, is a small portion of the psalterium of an Ox, prepared to show the different sizes of the laminæ of this cavity. These laminæ are of two kinds, large and small; the larger ones are of two sizes, which alternate with each other; but between each of the larger laminæ a small one is interposed. They are all beset with papillæ, and lined with cuticle, part of which has been turned down from one of the largest laminæ. No. 436, A, is a small portion of the spleen of a calf (*Bos Taurus*), which has been macerated after distension of the cells, to show the meshes of the cavernous structure of the spleen and the large size of the cells or spaces which they intercept. (*Cat.*, vol. i.) It should not be forgotten that the tongue of the Ox performs a principal part in collecting the food before it is submitted to the organs of mastication and digestion.



Skeleton of a cow.

Urinary System.—In the same museum will be found (No. 1222) the kidney of an Ox (*Bos Taurus*) minutely injected, and a section removed to show the ramifications of the pelvis, or elongated infundibula. The cortical substance presents externally a number of clefts extending inwards to a varying depth, and in some degree corresponding to the separate cones of tubuli uriniferi within; this gives a lobulated structure to the gland, which is permanent. A similar structure is observable in the human kidney at an early period of existence, but the clefts are afterwards obliterated by a continued development of the cortical substance. No. 1254 is a similar specimen, and No. 1255 is a smaller lobe of the same kidney, on one side of which the cortical substance is rent, to show the minute tortuous secerning vessels. No. 1256 is the section of the kidney of an Ox, showing three mamillæ converging to terminate apparently in one infundibulum; and No. 1258 exhibits a longitudinal section of the kidney of a bison, showing the numerous medullary cones and the ramifications of the pelvis which extend into the substance of the kidney to surround the mamillæ and receive the urinary secretion. The cortical substance is thinner than in the Ox, and the kidney shorter and broader. (*Cat.*, vol. ii.)

Brain, Nervous System, and Senses.—No. 1328, in the Physiological Series of the same museum, shows the brain of an Ox (*Bos Taurus*) injected, and the pia mater removed from the left hemisphere to show the convolutions, which are more numerous and wavy than in the sheep.

Sight.—This sense is acute in the genus *Bos* by day. The anterior perforation of the choroid coat, or pupil, is oblong. In the Physiological Series of the museum of the College, the broad transverse tapetum lucidum of the eye of an ox is well shown in the preparation No. 1728. The pigmentum in the ox, as well as in most if not all animals feeding on grass, has (in the same eye) certain portions which are white, and others which are of a fine green. The eyelids and nictitating membrane of a cow are exhibited in No. 1785, and bristles are placed in the puncta lachrymalia, and also in the ducts of some of the meibomian glands.

Hearing, also acute.

Smell and Taste.—Well developed. No. 1256 of the series above alluded to shows one of the inferior turbinated bones, with the pituitary membrane injected. The taste is also sufficiently developed, and from the supply of nerves must, in conjunction with the smell, be capable of accurately distinguishing the aroma of various plants in order to the selection of those which are most agreeable and wholesome, and the rejection of those which are disagreeable or noxious to it. That this power of distinction sometimes fails is fatally shown by the mortal consequences of browsing on the yew and other deleterious plants, to which the hungry animals have through carelessness or other accident had access.

Touch.—This sense cannot be very acute in the extreme ends of the extremities at least; though there is sensibility enough to warn the animal of injury and to guide its steps. More would have been superfluous and annoying. In the museum of the Royal College of Surgeons (Physiological Series), No. 256 exhibits the bisulcate foot of a calf injected. The nail or hoof is removed from one of the toes to show the vascular and sensible laminæ, similar to those in the horse, but much smaller. No. 1412 is the foot of a slink calf (*fœtus Vaccæ*) injected, showing the different states of the cuticular covering, which, although still thin and soft where the hoofs are afterwards to be perfected, is too dense at those parts to permit the vascularity of the corium to appear through; and No. 1413 is another foot of a calf injected, and the hoofs removed, to show the vascular laminæ and villi of the corium covering the last phalanges.

Food, Reproduction, &c.—Oxen are eminently herbivorous, for though they will browse upon shrubs and trees, grass and herbage is their staple; no one can watch a cow grazing without observing how perfectly the whole mechanism works together, the tongue sweeping in a whisp of herbage into the vice formed by the cutting-teeth of the lower jaw and the unarmed front of the upper one, and the muscles immediately aiding with the upward jerk to separate the bite from the roots on which it was growing. For an account of the varieties of oxen bred by the grazier, and of the food on which they are fatted for the market, see the article CATTLE. In a state of domesticated nature, that is, where the animal roams at large and is not stall-fed, or confined to what are called artificial grasses, or to artificial food, we are told in 'The Swedish Pan' (*Amœn. Acad.*, vol. ii.) that oxen eat 276 plants and refuse 218; that heifers waste away in enclosures where the *meadow-sweet* grows in abundance and covers the ground so that they can scarce make their way through it: 'the country-people,' says the author, 'are amazed, and imagine that the *meadow-sweet* affords them no nourishment; whereas the goat, which is bleating on the other side of the hedge, is not suffered to go in, though he longs to be browsing on this plant, which to him is delicate and nourishing food.' The leaves of the *Long-leaved Water Hemlock* are fatal to oxen, whilst the goat feeds heartily and safely upon it. Linnæus found that this plant was the cause of the terrible disease that raged among the horned cattle at Tornea. He had scarcely left the boat which carried him over the river to the fatal meadow before he was convinced. The cattle, it appeared, died as soon as they left off their winter fodder and returned to grazing; the disease diminished as the summer came on, at which time, as well as in the autumn, few died. The distemper was propagated irregularly and not by contagion: the cows were driven in the spring to the meadow where Linnæus landed, and where he saw plenty of the *Long-leaved Water Hemlock*, and there they died swollen and in convulsions. In other places the plant was scarce. 'The least attention will convince us,' says Linnæus, 'that brutes spurn whatever is hurtful to them, and distinguish poisonous plants from salutary by natural instinct; so that this plant is not eaten by them in the summer and autumn, which is the reason that in those seasons so few cattle die, viz. only such as either accidentally or pressed by extreme hunger eat of it. But when they are let into the pastures in spring, partly from their greediness after fresh herbs, and partly from the emptiness and hunger which they have undergone during a long winter, they devour every green thing which comes in their way. It happens moreover that herbs at this time are small, and scarcely supply food in sufficient quantity. They are besides more juicy, are covered with water, and smell less strong, so that what is noxious is not easily discerned from what is wholesome. I observed likewise that the radical leaves were always bitten, the others not; which confirms what I have just said. I saw this plant in an adjoining meadow mowed along with grass for winter fodder; and therefore it is not wonderful that some cattle, though but a few, should die of it in winter. After I left Tornea I saw no more of this plant till I came to the vast meadows near Limmingen, where it appeared along the road; and when I got into the town I heard the same complaints as at Tornea, of the annual loss of cattle with the same circumstances.' The author of the 'Swedish Pan' also observes that a hungry stomach will often drive animals to feed upon plants that were not intended for them by nature. But whenever this has happened, they, if they escape, become more cautious for the future, and acquire a certain kind of experience; and he instances the *Monk's-hood*, which grows near Fahluna, and is generally left untouched by all the animals that are accustomed to these places; but if foreign cattle are brought thither and meet with this vegetable, they venture to take too large a quantity of it, and are killed. He adds that the cattle that have been reared in the plains of Schonen and Westragothia commonly fall into a dysentery when they come into the woodland parts, because they feed upon some plants which the cattle used to those places have learned to avoid. *Meadow-Saffron* is among the plants deleterious to oxen if taken in any large quantity; and *Hellebore* is also said to be poisonous to them. *Yew* is fatal, as it is to herbivorous quadrupeds generally, the green temptation being probably too strong for cattle kept on short allowance. Actions-at-law in this country have not been uncommon against a defendant for not keeping up bounds or hedges, whereby the plaintiff's cattle strayed into places where yew-trees grew, fed on the branches, and so died.

Preparations illustrative of the organs of generation in the male will be found in the Physiological Series of the museum of the College, Nos. 2557, 2558, 2559; and Nos. 2756, 2757, 2758, 2759, and 2760, illustrate the female organs, the first of the last-named numbers exhibiting those of the American Bison, and the others those of the Cow (*Bos Taurus*), the Heifer, and the fœtal cow.

The period of gestation is nine months. The normal number is one; though there are not uncommon instances of the cow bringing forth twins, and rare cases of her producing three, and even more, at a birth. In the case of twins, if they be male and female apparently, the apparent female is generally barren, and is called a *Free Martin* (*Taura* probably of Columella, Varro, and the antient Romans).

Mr. Jesse (*Gleanings of Natural History*, 1838) states that if the cow has twins, one of them a male and the other a female: the latter is *always* barren; but this is an error, as we shall presently see. 'It is a fact known, and I believe almost universally understood,' writes John Hunter, in his *Account of the Free-Martin*,* 'that when a cow brings forth two calves, and one of them a bull-calf, and the other to appearance a cow, that the cow-calf is unfit for propagation, but the bull-calf grows up into a very proper bull. Such a cow-calf is called in this country a Free-Martin, and is commonly as well known among the farmers as either cow or bull. Although it will appear from the description of this animal, that it is an hermaphrodite (being in no respect different from other hermaphrodites), yet I shall retain the term *free-martin* to distinguish the hermaphrodite produced in this way from those which resemble the hermaphrodite of other animals; for I know that in black cattle such a deviation may be produced without the circumstance of twins; and even where there are twins, the one a male, the other a female, they may both have the organs of generation perfectly formed.'

Hunter goes on to state that the *Free-Martin* has all the external marks of a cow-calf as to the teats and the external female parts, or *bearing*, as the farmers term it; it shows no inclination for the bull, nor does the bull take notice of it. The form much resembles that of the ox or spayed heifer, and the animal is considerably larger than either the bull or cow, with horns similar to those of the ox. Its bellow is like that of an ox, having more resemblance to that of the cow than the bull, and, like the ox, it is used for the yoke and fattened for the table. The flesh is generally considered finer in fibre than that of either bull or cow, and to surpass that of the ox and heifer in delicacy of flavour, bearing therefore a higher price in the market; but there are not wanting exceptions where the flesh has turned out nearly as bad as bull-beef, certainly worse than that of a cow.

That the twin female is not always barren when the other calf is a male is proved by the following among other instances. Hunter relates that a cow belonging to Benjamin Way, Esq., of Denham, near Uxbridge, produced twins which were to appearance male and female. The latter died when about a month old. Upon examining the organs of generation, Hunter found that they were perfectly formed, and to make certain he procured those of a common cow-calf, and in comparison found them exactly alike. 'This,' he continues, 'made me regret that the animal had not lived to that age that might have determined if it was capable of breeding; for the construction of the parts being to appearance perfect, is not sufficient of itself to stamp it a true or perfect female. . . . . It is however most probable that this was a perfect female, which is an exception to the common rule; and I have been informed there are instances of such twins breeding.' Professor Owen, in his valuable edition of Hunter's 'Observations' (1837), adds a note from Loudon's 'Magazine of Natural History,' which states that Joseph Holroyd, Esq., of Wilbers, near Leeds, had a cow which calved twins, a bull-calf and a cow-calf. As popular opinion was against the cow-calf breeding, it being considered a free-martin, Mr. Holroyd was determined to make an experiment of them, and reared them together. They copulated, and in due time the heifer brought forth a bull-calf, and she regularly had calves for six or seven years afterwards. Nor are there wanting other cases of fertility under similar circumstances.

Hunter gives a dissection of three free-martins, a portrait of one, and figures of the organs of generation of all three, in the work last above mentioned, to which we refer the reader for farther particulars.

When a cow has twins and they are both bull-calves, the calves are in every respect perfect bulls; and if cow-calves, they are both perfect cows. At least we are not aware of any recorded instance to the contrary, nor have we ever heard of any.

In the 'Nouveau Bulletin des Sciences' is given an account of a cow which produced nine calves at three successive births: first, four cow-calves, in 1817; second, three, two of them females, in 1818; third, two females, in 1819. With the exception of two belonging to the first birth, all were reared by the mother.

EUROPEAN OXEN.

In addition to what is stated with regard to the supposed origin of our British domestic horned cattle in the article Bos-Urus (vol. v., p. 231, et seq.), we proceed to the consideration of the further opinions published on this difficult subject.

Colonel Hamilton Smith, who appears to have taken considerable pains in investigating the history of the *Ruminantia* generally, and of the Bovine family particularly, places the fossil species under *Bos (Taurus) Urus*, considering the wild cattle of Chillingham and other parks as the white variety.

Mr. Swainson (*Classification of Quadrupeds*) observes that all writers agree that the large skulls of oxen found in the more recent formations belonged to a formidable race of these animals which existed in Britain in a wild state; that they belonged without doubt to the species named *Urus* by Cæsar and other antient writers; and that these skulls not only possess a specific distinction, but exhibit the type of a form essentially different from that of the domestic ox. 'All these skulls,' he continues, 'are nearly one-third larger than those of the *Bos Taurus*; they are square from the orbits to the occipital crest, and somewhat hollow at the forehead. The horns, placed at the side of the above crest, show a peculiar rise from their roots upwards; then bending outwards, and then forwards and inwards. No domestic races show this turn; but numerous specimens of inferior sizes, found fossil in the Cornish mines, have this shape, and the wild bull of Scotland, the only example of this type now known to exist, retains it. The domestic oxen, on the contrary, of whatsoever country or breed they may be, have the square concave forehead, with the horns rising from the ends of the frontal ridge. . . . It appears then that the antient *Urus*, or wild bull, was a perfectly wild, savage, and untameable animal; not only does every account handed down from remote antiquity assure us of this, but it is even verified by the only living example of this *form* we possess, the *Bos Scoticus*, still preserved in one or two of the northern parks. Although domesticated so far as to live within such precincts without absolute unprovoked violence to its keepers, it retains essentially all the savage characters ascribed to the more powerful species mentioned by the antients. Like that also it possesses, when at a mature age, a kind of mane, about two inches long, and its throat and breast are covered with coarse hair. These characters, which are never found in the domesticated breeds of oxen, were no doubt much more highly developed in the antient *Urus*. The second type is the domestic ox; the external characters of which, to use the words of Major (Colonel) Smith, are "absolutely the same as the fossil *Urus*, and the wild breeds differ only in the flexure of the horns." But though these two types come so near each other in external appearance, nothing can be more different than their moral character; the *Urus*, wild, savage, and untameable, remains, with all these propensities unimpaired and undiminished, from the period of its first creation down to the present day. The other, tame, harmless, and enduring, has voluntarily submitted to the service of man from the most remote antiquity, and seems to have been a companion of the earliest inhabitants of the earth.' Thus far Mr. Swainson (1835).

Sir W. Jardine (*Naturalist's Library,—Ruminantia*, part ii., 1836) remarks that by most persons it is thought that the domestic races of our cattle are originally sprung from the *Bos bubalus*, the Indian and European buffalo. 'Some again,' continues Sir William, 'treat of them as arising from the aurochs or wild cattle of Germany and Poland. These, according to the system of Smith, come into a subgenus different from the domestic breeds; and from both these suppositions the opinion of Baron Cuvier varies, as he is inclined to consider our present cattle identical with a species no longer existing in a wild state, but which has, by the exertions of man, as in the instance of the camel and dromedary, been for ages entirely subjected to his power. The remains of this animal have been found in a fossil state, and it is upon the comparison of these remains with the skeleton of the aurochs, the buffalo, and our domestic races, that the Baron has founded his opinion.'

Mr. Bell (*British Quadrupeds*, 1839,—the *Ox*), after referring to Griffith's Cuvier for Colonel Hamilton Smith's interesting and learned dissertation upon the mythology and antient history of the ox, says, 'Whether the ox exist now, or have existed within the range of sound historical testimony, in its original state, or whether, as in the case of the horse, all the instances of the occurrence of wild oxen of this species now on record have not been derived from the domestic race, fortuitously escaped from servitude and become wild, is a question which it is difficult if not impossible satisfactorily to solve. The antient accounts of the Urus, or wild ox, declare it to have been an animal of enormous size and great fierceness; and the horns are described as being large, spreading, and acute. In this country, and in many parts of the Continent, have occurred numerous fossil bones of oxen, with large horns, having the form and direction of those of certain breeds only of our present cattle, particularly of such as are most wild; as for instance the celebrated wild white oxen of Craven, of Chillingham Park, and of Scotland, the *Bos Scoticus* of some authors. I cannot but consider it as extremely probable that these fossil remains belonged to the original wild condition of our domestic ox, an opinion which Cuvier appears to have entertained, who calls the skulls "Crânes semblables à ceux d'un bœuf domestique." They are found only in very recent deposits, frequently in caverns mingled with the remains of various other animals, as in the celebrated cave of Kirkdale, and in different parts of Cornwall and of Devonshire. I have several teeth and some fragments of bones from Kent's Hole, in the latter county, where they were found in the same mass with the remains of the elephant, the rhinoceros, the deer, the bear, and the hyæna. Cuvier however considers that they existed after the destruction of the latter species. It has indeed been attempted to prove that the antient remains alluded to, together with the Chillingham and Scottish breed, belong to a distinct specific type from the common domestic ox; and some modifications of structure have been cited in proof of this opinion. It does not appear to me however that these modifications are of sufficient value to constitute specific distinction, as they appertain only to parts which are very variable in particular breeds of the domestic cattle; they are, some slight differences in the form and direction of the horns, and the existence, in *old Bulls*, of a short rudimentary mane, and some hair upon the breast. Now there is certainly no point of sufficient importance to form a specific distinction, even were the form of the horns less variable than they are in our domestic oxen. We require yet a series of well authenticated and well directed experiments on the intermixture of the Scottish or Chillingham cattle with the domestic breeds, and the fertile or infertile character of the progeny; which, if the views I have so repeatedly stated be correct, would at once decide the question. Even Colonel Smith himself, a high authority in these matters, although he urges the specific distinction of the two animals, says, "the character of the domestic oxen is absolutely the same as the fossil, and the wild breeds differ only in the flexure of the horns and external appearance, occasioned by the variations of climate, food, and treatment." But, it may be asked, do variations of climate, food, and treatment produce specific distinctions? And yet this distinction is, as I have just stated, held both by Col. Smith and Mr. Swainson. Upon the whole, I cannot but believe that the fossil bones belonged to the original stock of our domestic ox, and that the wild white cattle, the *Bos Scoticus* and *Urus Scoticus* of the authors just named, approach so near to it as to leave it a matter of doubt, *not* whether they all belong to the same species, but whether this breed be the actual remnant of that original stock, or the descendants of domesticated individuals, which have resumed in a great degree their wild character from having ceased through many generations to feel the effects of human domination.'

Mr. Henry Woods, in his *Description of the fossil Skull of an Ox (Bos Primigenius), discovered in May*, 1838, *at Melksham, Wilts.* 4to., 1839, after premising with reference to this part of the inquiry, that unfortunately two distinct species of Bos have received the title of *Urus*, states that the subject appears to him to stand thus: 'The *Urus* of the antients, *Bos Taurus*, Linn., is the ordinary wild bull of Central and Northern Europe, in some parts of which it is said to exist at the present day, particularly in Lithuania, Poland, &c., which is however somewhat more than doubtful; this is the true *Urus* (most probably a very old corruption of *Taurus*) of Cæsar, in whose time a remnant of the race seems to have existed—the *aurochs* of *antient* Germany, and the typical species to which the remains here described are to be referred.

'The *Bubalus* of Cæsar, bison of the antients, *Bos bison*, Linn., *Bos Urus*, Bodd., is the true auroch or bison of the modern Germans; and there is no doubt but that, as remarked by Cuvier, all the error and uncertainty as to the identity and separation of these species have arisen from the former having become extinct, or merged entirely into the state of domestication, and its original title having been transferred to the latter—an animal very similar in size, figure, and habits, and now existing in a wild state in the districts formerly inhabited by the *Urus* or common ox:—these are principally Poland, where it is termed the *Subr* or *Zubr*; the forests of Southern Russia; and the Carpathian and Caucasian mountains.'

We must not omit the opinion of Bojanus, who (*Nova Acta Academiæ Naturæ Curiosorum*), as long ago as 1826-7, after reviewing those advanced by Cuvier and others concerning the *Urus* or *Bison* of Eastern Europe, and the fossil remains of the different races of the Bovine genus, and giving a detailed account of the habits and structure, and more particularly of the bony skeleton, of the celebrated breed, which is at present restricted to Lithuania, containing about six hundred head, was decided in coming to the conclusion that the *Urus* and *Bison* of the Greeks and Romans, and of later European authors, are one and the same animal; and he refers the fossil remains of the genus to two distinct types; the one which he denominates *Urus priscus*; and the other, the *Bos primigenius*, approximating, but in a less degree, to the domestic ox.

It now becomes necessary to turn our attention to the British wild cattle still in existence, and so often referred to in the course of every argument touching the origin of our domestic oxen. These wild cattle are stated by Lesley to have inhabited the great Caledonian Forest in antient times, and more recently they were to be found in Chillingham Park, Hamilton, Wollaton, Gisburne in Craven, Lime-hall in Cheshire, Chartley Park, &c. In the first-named of these localities they are carefully preserved in their pristine purity, and we select the description of these in Bewick (Mr. Culley's, we believe) as being of older date than some of the interesting accounts lately published, and to which we shall presently advert. 'Their colour is invariably of a creamy white, muzzle black; the whole of the inside of the ear, and about one-third of the outside, from the tips downwards, red; horns white with black tips, very fine and bent upwards; some of the bulls have a thin upright mane, about an inch and a half or two inches long. At the first appearance of any person they set off in full gallop, and at the distance of two or three hundred yards make a wheel round, and come boldly up again, tossing their heads in a menacing manner: on a sudden they make a full stop, at the distance of forty or fifty yards, looking wildly at the object of their surprise; but upon the least motion being made, they all again turn round and fly off with equal speed, but not to the same distance: forming a shorter circle, and again returning with a bolder and more threatening aspect than before, they approach much nearer, probably within thirty yards, when they make another stand, and again fly off; this they do several times, shortening their distance, and advancing nearer, till they come within ten yards; when most people think it prudent to leave them, not choosing to provoke them further; for there is little doubt but, in two or three turns more, they would make an attack. The mode of killing them was perhaps the only modern remains of the grandeur of antient hunting. On notice being given that a wild bull would be killed on a certain day, the inhabitants of the neighbourhood came armed with guns, &c., sometimes to the amount of a hundred horse, and four or five hundred foot, who stood upon walls, or got into trees, while the horsemen rode off the bull from the rest of the herd, until he stood at bay, when a marksman dismounted and shot. At some of these huntings, twenty or thirty shots have been fired before he was subdued. On such occasions the bleeding victim grew desperately furious from the smarting of his wounds and the shouts of savage joy that were echoing from every side: but from the number of accidents that happened, this dangerous mode has been little practised of late years; the park-keeper alone generally shooting them with a rifled gun at one shot. When the cows calve, they hide their calves for a week or ten days in some sequestered situation, and go and suckle them two or three times a day. If any person come near the calves, they clap their heads close to the ground, and lie like a hare in form to hide themselves: this is a proof of their native wildness, and is corroborated by the following circumstance that happened to the writer of this narrative, who found a hidden calf, two days old, very lean and very weak—on stroking its head, it got up, pawed two or three times like an old bull, bellowed very loud, stepped back a few paces, and bolted at the bait with all its force; it then began to paw again, bellowed, stepped back, and bolted as before; but knowing its intention, and stepping aside, it missed him, fell, and was so very weak that it could not rise, though it made several efforts; but it had done enough; the whole herd were alarmed, and coming to its rescue obliged him to retire; for the dams will allow no person to touch their calves without attacking them with impetuous ferocity. When any one happens to be wounded, or is grown weak and feeble through age or sickness, the rest of the herd set upon it and gore it to death. The weight of the oxen is generally from forty to fifty stones the four quarters; the cows about thirty. The beef is finely marbled and of excellent flavour. Those at Burton Constable in the county of York were all destroyed by a distemper a few years since. They varied slightly from those at Chillingham, having black ears and muzzles, and the tips of their tails of the same colour; they were also much larger, many of them weighing sixty stones; probably owing to the richness of the pasturage in Holderness, but generally attributed to the difference of kind between those with black and with red ears, the former of which they studiously endeavour to preserve. The breed which was at Drumlanrig in Scotland had also black ears.'

Now though there is unquestionably in this interesting account ample evidence of wild habits, there is nothing to be found in it to show that the race had not been at some time under the dominion of man, and from circumstances had been for a series of years liberated from his yoke. The prevailing white colour is not usually found in mammiferous races which have never been domesticated;* and with regard to the red ears, Mr. Bell twice admits the probability of the pure creamy white body, the red ears, and the black muzzle being a true specific character; since (he says) he has been in the habit, ever since he was a boy, of examining every white specimen of cattle that has come within his observation, and he has never yet seen one that had not some colour about the ears, either red or black, according to the breed. His attention was first attracted to this by having, when a schoolboy, seen a beautiful pure white calf, belonging to the parent of one of his schoolfellows, and, finding that about half of the ears was red, it struck him that such might possibly be an invariable character, and so, he says, he has found it.

With regard to the test of breeding proposed by Mr. Bell, it is stated in a note to the narrative quoted above from Bewick, that tame cows in season are frequently turned out amongst the wild cattle at Chillingham and admit the bull; and that the calves produced by these means are invariably of the same colour with the wild breed (white with red ears) and retain a good deal of the fierceness of their sire. In Sir William Jardine's volume above alluded to, the weight of the Chillingham cattle is said to reach from fifty to sixty stones, and the oxen are stated to feed kindly, approaching near to the Lancashire breed, the horns being long and beautifully turned. 'A few years ago, a fine ox was fed to a large size, and was quite tame and gentle.' The turning out of tame cows, mentioned in Bewick, is, it seems, no longer permitted, for the present keeper at the park (1836) at one time possessed a wild cow, which he had taken when a calf, in consequence of the death of its mother; it was gentle, was milked as a cow, and bred freely with the common bull; but the propagation was not allowed to proceed farther, the calves being killed at an early age; at Hamilton also great care is taken to preserve the breed, and if a cross should take place with the domestic bull, the young is destroyed. (Jardine.) We can understand the pardonable pride of keeping up this fine ancient breed of cattle in all its purity;† but we must nevertheless regret that the experiment had not been allowed to proceed so as to afford the test alluded to by Mr. Bell.

But though these wild cattle have for a long period been looked upon by many as the descendants of the aboriginal race of Oxen in Great Britain, serious doubts, supported by reasoning of some strength, have been entertained of their claim to such high antiquity.

The author of the article *Bos*, in the 'British Cyclopædia,' is of opinion that they are not descended from the aboriginal stock, but that they are domesticated oxen which have run wild, and that the race was originally imported by the ecclesiastics from Italy, where herds of wild cattle much resembling them still exist. The Gisburne wild oxen* are said to have been originally brought from Whalley Abbey in Lancashire, upon the dissolution of that monastery in the time of Henry VIII. Sir William Jardine gives a very interesting account of the Hamilton herd by Robert Browne, Esq., chamberlain to the duke. 'These cattle are larger and more robust than Lord Tankerville's; their body is dun white; the inside of the ears, the muzzle, and the hoofs black; and the fore part of the leg, from the knee downwards, mottled with black. The cows seldom have horns. Their heads are rounder than in the Tankerville breed. The roof of the mouth is black, or spotted with black, and the tongue is black, and generally tipped with black.' Mr. Hindmarsh's paper read to the British Association in 1838, gives a history of the principal herd at Chillingham, and a graphic description by Lord Tankerville himself. Sir Philip Egerton ('Annals of Nat. Hist.,' 1839) states, on the authority of a MS. record, that the same breed of wild cattle existed at Bishop's Auckland in 1635. Mr. Woods thinks that there appears considerable doubt as to their being truly descendants of a native race, and quotes Lord Tankerville's letter. 'In the first place,' says his lordship, 'I must premise that our information as to their origin is very scanty; all that we know and believe in respect to it rests on conjecture, supported however by certain facts and reasonings, which lead us to believe in their antient origin, not so much from any direct evidence, as from the improbability of any hypothesis ascribing to them a more recent date.'

It is dangerous to prophesy; but we venture to believe that, if a cross with the common bull were to be permitted, the offspring would be as fertile as any of the varieties which now adorn the pastures of Great Britain and Ireland.

The most accurate representation of the Chillingham breed known to us, with the exception of Edwin Landseer's, is 'The Wild Bull of the Antient Caledonian Breed, now in the Park at Chillingham Castle, Northumberland,' designed and engraved by Thomas Bewick, and printed at Newcastle by Solomon Hodgson, in 1789. The size of the cut was 9¾ inches by 7½ inches, and only 230 copies were printed. It was the largest wood-cut that Thomas Bewick ever engraved, and is justly celebrated as his masterpiece. After the few impressions were taken, the block broke into several pieces; these pieces were bound together with iron, with the exception of the figured border, which was about three-quarters of an inch in breadth, cut upon several pieces of wood, and put round the block; and in 1817, impressions were printed by Edward Walker, Newcastle, without the border; the size of the cut being then reduced to 7¾ inches by 5½ inches. About six proof impressions were taken off on vellum from the block in its original state, and are highly valued. (*Memoir, Select Fables*, 1820.) The figure of the Wild Bull in Bewick's 'Quadrupeds' is tame in comparison.

We now proceed to consider the Ox in an economical point of view.

Ox or *Steer* is the castrated male of the bovine race: he is called an *ox-calf* or *bull-calf* until he is a twelvemonth old, a *steer* until he is four years old, and after that an *ox* or *bullock*. A sufficient number of the most likely of the male calves being selected for the future propagation of the breed, the others are castrated between the first and third months.

The advantages derived from the performance of this operation are very great. The nutriment, which is no longer directed to the sexual organs, goes to the general enlargement of the frame; the propensity to fatten is abundantly increased, and the animal becomes far more docile and tractable. The use of the ox in agricultural and other labours may be traced in almost every country and to periods of the remotest antiquity.

The education of the steer should commence between the second and third year. At an earlier period he has scarcely sufficient strength, and at a later one he may have become obstinate and self willed. His education should be founded on patience and kindness, and then the term of it will be far shorter than is generally imagined, and the result will be permanent.

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* The White Bear is certainly an exception to the [illegible]; but it may be [illegible] as an exception to the [illegible]; the same in the Alpine [illegible]

† [illegible]

* White, like the Chillingham cattle, but hornless, and without the inside of the ears [illegible].

There has been much dispute with regard to the comparative advantage of the employment of cattle and horses in agricultural labours. The former are said to cost less and to be supported at less expense. For the latter it is pleaded that a smaller number are needed—that the work is, on pressing occasions, far more quickly performed, and that it is always abundantly greater. The plain matter of fact however is, that although the ox is still used for slow and heavy work on many farms, he is not so generally employed as he used to be, even by his warmest advocates, and the use of him has been completely abandoned by a very considerable number of agriculturists.

In the native counties of the best breeds, he is still admired and valued as a beast of draught, but by the majority of farmers his value is now chiefly or solely estimated by the quantity and quality of the meat that he will yield, according to the care that is bestowed upon him and the expense that is incurred. He is in the fullest perfection at four years old, and he will then prove more profitable to the farmer than if he were worked four or five years longer, when the quality of his flesh will be deteriorated and his disposition to fatten considerably impaired.

The consideration of the principal *diseases* of cattle was purposely deferred until their different breeds and varieties and uses had passed under consideration. They are not so numerous as those of the horse, but there is often considerable difficulty attending the treatment of them. From the peculiar temperament of cattle and the comparatively great quantity of blood which flows in their veins, promptness in the recognition and the treatment of disease is of far greater consequence than in the horse, rapid as is often the progress of his maladies. Few of the diseases of the horse destroy him at once; but there are many maladies of the ox which must be met at the instant, or they will be uselessly struggled with afterwards. Let the owner and the veterinary surgeon take good heed of this.

The *diseases of calves* should be first considered. They are as numerous as those of the colt, and more fatal. At the head of them stands *diarrhœa*. This sometimes occurs when the calf is suffered to continue by the side of its own dam. Both starvation and excess of food in the mother will produce it. More particularly will this be the case when a foster-mother is employed. If she has calved but a very few weeks before the newly-dropped young one is put to her, the bowels of the calf will almost certainly be disturbed. Where it can conveniently be accomplished, every calf should be reared by its own dam. A state of considerable purging should never be neglected many days, and more especially if the animal loses its gaiety or is in evident pain, or the dung is unusually offensive or tinged with blood. The grand cause of this is acidity in the stomach or intestines, which gradually causes inflammation of the inner coat of these vessels. The irritation here set up is communicated to the constitution generally, and exhaustion and death ensue. Then recourse must be had to a compound medicine, the value of which cannot be too highly estimated. It is borrowed from the work on 'Cattle,' published by the Society for the Diffusion of Useful Knowledge, and the farmer should never be without it. There should be an alkali, chalk, to neutralise the acid; an astringent, catechu, to arrest the discharge; a sedative, opium, to allay the irritation; and a carminative, ginger, to support the strength of the patient. These should be mingled in the proportions of eight parts of the first, four of the second, one of the third, and two of the fourth. A large teaspoonful of this powder should be given twice or thrice in the day, according to circumstances.

Costiveness is a contrary disease to this. It should never be suffered to continue long, for it is fraught with danger. The best aperient for calves and cattle is Epsom salts, in doses of from one to two ounces, with a scruple or half a drachm of ginger.

Cough should be promptly attended to the moment that it is heard. A dose of physic, small doses of powdered foxglove, with nitre, or, in bad cases, a slight bleeding, will usually remove it.

In proceeding to the diseases of adult cattle, we are struck with the numerous *diseases of the eye*. *Ulceration of the lids* will generally yield to the nitrated ointment of mercury locally applied, and a course of alterative medicine. *Warts* should be excised by means of a pair of scissors, and the root touched with nitrate of silver.

For inflammation of the *haw*, or membrane at the corner of the eye, a weak goulard lotion, or the tincture of opium, lowered with ten times its quantity of water, will be useful; but if there is any fungous growth on the haw, extirpation will afford the only cure. *Inflammation of the eyelids* will generally yield to fomentations of warm water. For *inflammation of the eye*, warm or cold fomentations, the former at the first, and the latter a day or two afterwards, with the opiate lotion at the commencement, and a very diluted one of white vitriol—two grains to the ounce—when the inflammation is subdued, with a moderate bleeding or a dose of physic, will constitute the most successful means of cure. *Ulceration of the eye* will be best treated with the opiate lotion, but *cataract* and *gutta serena* do not admit of cure.

In *fracture of the horn*, if the bones are not quite separated, they may be bound together by tarred cords or splents. If there is a perfect fracture of the bone, it should be sawn off as closely as possible to the head, and a hot iron passed over the surface.

Water in the head in calves, known by the enlargement of the head and the stupidity of the animal, admits not of any cure. The *giddiness* which is sometimes observed in them and even in the adult beasts—turning round and round—is usually hopeless.

Apoplexy, or sudden determination of the blood to the head, produced by the forcing system being carried too far and the process of fattening hurried too rapidly on, can be cured only by the most decisive measures. The animal that is thus *struck* must be bled until he faints, and powerful purgatives administered and continued. *Phrenzy* is produced by the same cause, and can only be cured by the same treatment. In these cases, 15 or 20 drops of the croton oil should be added to the aperient. *Locked-jaw* too frequently bids defiance to medical treatment. The only hope of cure consists in active bleeding and the continued use of Epsom salts and croton oil, until the bowels are opened. Immediately after the bleeding, the jaws will usually be found sufficiently relaxed to admit of the administration of medicine. This golden opportunity should never be lost. As an adjuvant, a seton of black hellebore in the dewlap may be tried. Young cattle are occasionally subject to *fits*. Almost without warning, the beast staggers, falls, bellows, and is convulsed in every limb. This is the consequence of over-heating or over-driving, or both. The physic and the fleam must be here put into active use. Perhaps it would be prudent to send such a patient to the butcher with very little delay.

Rheumatism.—There are few diseases of more frequent occurrence among cattle than this. It is not long absent in a low marshy situation, and it is the constant attendant on careless or cruel exposure to cold and wet. It is recognised by the difficulty of motion and the occasional expression of pain. The cure is comprehended in one word, 'comfort.' A little mild physic, with warm comfortable drinks and gently stimulating applications, will hasten and confirm the cure. Connected with or a consequence of rheumatism is *swelled joints*, yielding sometimes to stimulating embrocations and comfortable lodging. There are however other tumours unconnected with the influence of cold; such are fluctuating tumours, usually about the knees, which require stimulating embrocations and the occasional use of the *budding-iron*, followed by the application of a blister when the fluid has escaped. Other tumours, also in the neighbourhood of joints, are of a hard character. They will generally yield to frictions with an ointment of the hydriodate of potash, this drug being also administered internally in doses of 6 or 8 grains daily. The too frequent consequence of these affections is *palsy*, at first confined to certain limbs, but gradually spreading over the frame, being however most visible in the hind extremities. Here again the whole treatment may be included in the comprehensive word 'comfort.' Small doses of physic, the administration of the white antimonial powder, the use of stimulating embrocations, with warm lodging and good food, especially mashes, will be useful adjuvants.

As for that species of nervous affection, *rabies* or *madness*, it admits not of cure; and it has but one cause, namely, the bite of a rabid or mad dog. If a farmer knows that certain beasts have been bitten, or has strong reason to suspect it, he will act wisely in sending them to the butcher, for after the disease has once appeared, there is no cure, and the meat is spoiled.

It is time to revert to the diseases of other systems and parts. Too frequent and destructive is that inflammation of the tongue and mouth, recognised by the name of *blain*. It consists of vesicles and tumours occupying the side of the tongue and the membrane of the mouth, speedily ulcerating, becoming gangrenous, producing much swelling of the face and head, and rapidly destroying the animal. It often appears under the form of an epidemic, and it is frequently contagious. The mouth should be well cleansed with a solution of the chloride of lime. Blood should be abstracted at an early period of the disease, and mild purgatives administered; but if the complaint has attained its height before any treatment is adopted, the chloride of lime should still be used, and also the physic, but it should be accompanied by some stimulating ingredients, as gentian or ginger, or both.

All cattle are subject to *fever*. The dry muzzle and the heat at the root of the horn, and the heaving at the flanks, are sufficient proofs of it. If this is early observed, a dose of physic and one or two mashes will usually set all right. At times however the attack is sudden and more violent, and danger is evident from the very commencement. The farmer recognises this affection by the terms *black-quarter*, *quarter-ill*, *blood-striking*, &c. The beast is seen with his head protruded, his nostrils expanded, and his flank heaving, the breath and horn hot, and the eyes bloodshot. There is a peculiar crackling sound if the loins are pressed upon, and the slightest pressure gives extreme pain. Ulcers appear on various parts of the body, and every part seems tending to corruption. This disease is sometimes epidemic, but it is quite as often the consequence of the fattening process being hurried on too rapidly. In the early stage of such a complaint, the treatment will consist of copious bleeding and brisk purging. These should be continued until they produce their effect, and then some sedative medicine, as foxglove or emetic tartar, administered, and persisted in until the disease is evidently yielding. After this some mild stomachics, as gentian and ginger, should be administered.

Too frequently however the treatment has not been sufficiently severe or was not commenced early enough, and a peculiar low fever begins to be apparent. There is dysentery, which no astringent will arrest; ulcers, which defy the power of every disinfectant; and the animal dies one mass of putridity. In this stage of the disease, and also in many of the complaints that have been described, the assistance of an educated veterinary surgeon should be requested, for the treatment is complicated and difficult to a great degree.

The diseases of the respiratory system require particular notice: most frequent among them is *cough*. It is too little regarded by the owner, but it is often the unsuspected messenger of consumption and death. There is no rule of more universal application in cattle practice than that a chronic cough is the forerunner of everything that is bad. While the beast feeds well and the muzzle is cool and moist, and the flanks are quiet, the dairyman feels no alarm, although he hears the cough almost every time that he enters the cow-house. By-and-bye however he finds that the cow is losing condition, and her quantity of milk is evidently diminishing, and he begins to think that there is some necessity for attending to the case. It is then too late: the seeds of consumption are sown, and he must part with her immediately, or she will pine away and die. In every case of severe cough, moderate bleeding and purgation should be had recourse to, with warm mashes and a comfortable cow-house. The same treatment will apply to the *epidemic catarrh*, which is sometimes so prevalent. When this catarrh assumes a malignant form, as in *murrain*, the treatment will be little different from that of black-quarter. *Sore throat*, or inflammation of the upper part of the throat and the back of the mouth, should be treated as cough, except that a blister or some stimulating application should be had recourse to. The same may be said of *bronchitis*, but there is a peculiar form of it to which young cattle are subject, and which bids defiance to all medical treatment, namely, the choking of the windpipe and passages of the lungs by an innumerable host of minute worms. No medicine will be of avail here.

Cattle are comparatively seldom attacked by pure *inflammation of the lungs*. This disease principally occurs when the beasts have been compelled to travel too far or too fast, and when they are exposed to sudden variations of temperature. It may be known by the drooping head, the heaving flank, the frequent painful cough, the obstinate standing, the hot mouth, and the cold feet. The animal should immediately be bled until the pulse falters. In all cases of inflammation and danger, this is the guide. No specific quantity should be ordered or taken. The faltering of the pulse is the unerring indication of the abstraction of the proper quantity. If the pulse again throbs loudly, the bleeding should be repeated. The bowels should be opened by means of Epsom salts. Setons in the dewlap should not be forgotten, and blisters should be rubbed on the sides with right good earnest. The diet should consist of thin gruel and mashes. *Pleurisy* may often be distinguished by a peculiar symptom, twitchings and shiverings about the chest and shoulders, these being the parts external to the seat of pain. Little waves appear to be stealing over the skin, and the animal shrinks when the sides are pressed upon. The treatment is the same as in inflammation of the lungs. *Consumption* is the most frequent and fatal of all the diseases of the chest in cattle. It is the consequence or the winding up of every other pulmonary complaint. It is distinguished by a feeble and hoarse cough, evidently accompanied by pain, and interrupted before it is perfectly completed. For awhile the beast may continue to thrive; she, for it is oftenest a disease of the female, may increase in condition; but she will presently begin to waste rapidly away. Medicine is powerless in this disease. The animal must be disposed of or destroyed.

First among the diseases of the *digestive* system is *choking*, or the stopping of a piece of carrot or turnip, or other hard substance, in its passage down the gullet. The cart-rope or the cart-whip is resorted to, in order to force it along the canal, and much mischief has ensued from the violence that has been resorted to on these occasions. Probangs are now constructed at trifling expense, and may be had from most surgical-instrument makers in town and country, by means of which the purpose may be readily effected and without danger.

From the gullet the food passes into the stomachs of the animal, of which there are four. The first is the *rumen*, or paunch, into which the imperfectly masticated food, as it is hastily gathered, descends. It is there macerated and prepared to be returned for a second or more complete grinding. Sometimes this stomach becomes overloaded with food: this is the *grain-sick* of the dairy. The animal refuses to eat, he becomes uneasy, moans, swells at the flank, and a kind of unconsciousness gradually steals upon him. The symptoms are often treacherous, and would deceive him who was not thoroughly acquainted with the diseases of cattle; but the introduction of the probang, if necessary, will reveal the real state of the case. The stomach-pump will be of admirable use here. Any quantity of fluid can be injected into the stomach, and the hardened mass may be rendered more fluid, and removed by means of the pump; or, if the stomach is too full to admit the probang, and to be thus evacuated, an incision may be made in the flank, and the accumulated mass withdrawn by the hand.

At other times an unnatural fermentation commences, and the stomach is inflated with gas. One look at the sides will sufficiently indicate the inflation of the paunch. This is termed *hoove*. The first indication of cure is to get rid of the gas. This may be accomplished by the introduction of substances that will chemically combine with it. The chloride of lime will effect this. The principal gas in the inflated stomach is hydrogen. The chlorine leaves the lime and combines with the hydrogen, and the compound does not occupy a thousandth part of the space previously occupied by the hydrogen. Two drachms of the chloride of lime will form a cheap and a very efficient agent. But if this is not at hand, then a puncture may be made into the left flank with perfect safety. If this is done with a trocar, the canula may remain in the wound, and the gas will continue to be extricated while any considerable portion of it remains. In default of a trocar, a penknife may be used; but as the upper portion of the stomach sinks with the disengagement of the gas, the aperture through the skin and that into the rumen will cease to be accurately opposed to each other; and some of the gas and the contents of the stomach will enter the cavity of the abdomen, and will be the cause of future illness, or peritonitis, or death.

The gas having escaped, a purgative should be administered, with a double dose of the aromatic, in order to excite the stomach to resume its duty.

The *loss of cud*, or the cessation of rumination, is only the indication or the consequence of other disease, and will cease with it. If the nature of that disease is not clear, a dose of physic, with the usual or more than the usual quantity of the carminative, may be given.

The diseases of the second stomach, the *reticulum*, or *honey-comb*, are few, and not easily distinguished. The simple function of that stomach is to prepare the pellet of food for remastication.

The third stomach, the *manyplus*, has more to do. The food which has not undergone sufficient comminution in the second mastication is seized by the rough and powerful leaves of this stomach, and is ground down, as it were, in a living mill. Sometimes however there is a deficiency of moisture in this stomach, or the muscular apparatus of the leaves does not act with sufficient energy, and at length the manyplus becomes perfectly paralysed by the distention caused in consequence of the undue quantity of food which is accumulated in it. This is known by the name of *fardel-bound*. The symptoms are not always evident. Dullness, want of appetite, disinclination to move, and costiveness, are among the usual indications. The treatment is simple, but too often ineffectual. It consists in the frequent administration of small doses of purgative medicine, with more than the usual quantity of carminatives; at the same time, a small stream of warm water is, by means of a horn or the stomach-pump, made to flow down the gullet and pass through the canal at the base of this stomach, thus gradually dislodging and washing away a portion of the accumulated and hardened contents.

The principal disease of the *abomasum*, or fourth stomach, is inflammation, designated by evident uneasiness, the resting of the muzzle on the situation of this stomach, or a peculiar stretching out of the fore-legs. Venesection and purgatives should be used in this case. Of the indications of disease in the *spleen* little is known. Inflammation is often found in it, with enlargement, induration, or softening of its substance. These circumstances however are rarely suspected during life.

To *diseases of the liver* these animals appear to be peculiarly-prone. A yellowness of the skin betrays the existence of biliary affections in a great proportion of the inhabitants of every dairy. When acute inflammation of the liver exists to any considerable extent, not only this yellow tint of the integument will be found, but tenderness on the right side, fullness there, and the direction of the muzzle to it. The proper remedies are those used in inflammation of other viscera, with the addition of blisters over the diseased part. Chronic inflammation is far more prevalent than that which is acute. The indications are, want of condition, the same tint of the skin, and obstinate cough. The remedies are gentle purgatives and succulent food. When obstruction of the biliary ducts takes place, there is a still deeper yellow, invariably accompanied by loss of condition. The animal then has *jaundice*, or the *yellows*. If much fever accompanies it, recourse must be had to bleeding and to physic.

Among the various intestinal diseases of the ox stands *enteritis*, or inflammation involving all the coats of the intestines. Young and fattening cattle are most subject to it. It is not however of very frequent occurrence, except as an epidemic, and then it is very destructive. *Wood-evil* and *moor-ill* are varieties of the same disease. They must be treated by bleeding, purgatives, blisters on the belly, mashes, and gruel.

Diarrhœa, or purging without the discharge of mucus mingling with the fæces, is produced by various causes, and particularly by a change or excess of food. It is often epidemic in the autumn. A mild purgative should first be given, and then the mingled but very efficacious medicine already recommended for a similar disease in calves.

Dysentery in the adult, as well as in the young animal, is indeed a fearful disease. Its causes are often obscure, and the means of successfully arresting its progress are a desideratum. Its principal characteristic is the discharge of mucus with the fæces, recognised by the appearance of bubbles standing for awhile on the fæces. The length of time which they continue there unbroken may be considered as a kind of admeasurement of the quantity of mucus actually discharged, or, in other words, of the danger of the case. The progress of the disease is rapid or slow according to circumstances which it is difficult to appreciate; but, in the usual course of things, the animal wastes away almost to a skeleton, and then dies.

Notwithstanding the purging, the first indication of cure is to bleed. It is an inflammatory disease, and that inflammation must be subdued. To the abstraction of blood should succeed the administration of an aperient, and castor oil, as being the least irritative, will be the best. Injections of gruel should follow; and, when the dung has somewhat resumed its natural character, astringents may be administered, at the very head of which, in this case, stands opium: a little calomel should perhaps be mingled with it as an alterative, and, after that, the vegetable tonics must perfect the cure. Cattle are subject to *flatulent* and *spasmodic colic*, for both of which the vegetable tonics will be the best cure, with a little of the chloride of lime to absorb the gas, and the abstraction of blood if there is any inflammatory action. Walking exercise and friction of the belly should not be omitted. For *strangulation* of the intestines there is seldom any cure but by means of an operation which a skilful veterinary surgeon alone can perform. In cases of *constipation*, the aperients must sometimes be long administered before the bowels will be opened. There will be no danger in this, provided the Epsom salts, alone or with a small portion of aromatic powder, are administered. *Dropsy* in cattle seldom admits of cure. Although an operation may be resorted to, the belly fills again, nor will any physic or diuretic arrest the evil.

Among the supposed diseases of the urinary organs, but much oftener of the digestive ones, stands *red-water*, so called from the colour of the fluid which is evacuated. It is materially connected with the pasture, but sometimes it has an epidemic character. In the acute form of the disease the water is red. This must be combated by bleeding and purging, until the bowels respond. In chronic red-water the urine has a brown tinge at first, but a red hue gradually mingles with it. This is difficult to treat. The principal hope of cure consists in the exhibition of Epsom salts until thorough purging is produced. Some mild carminative may then be given. *Black-water* is only a variety, or the concluding stage of red-water.

Puerperal fever, or dropping after calving, is a disease that has been very much misunderstood. A few days after calving, the cow suddenly loses all power over her hind limbs. She falls, and continues down three, four, or more days, until the power of voluntary motion returns, or she dies. It is inflammation of the womb or of the spinal cord, which extends to the organs of motion in the hind extremities. She must generally be bled, and always purged. No half measures will do here; the bowels being once opened, the cow will frequently get up, and there will be an end of the matter. Injections will materially assist the action of the physic. Whatever apparent weakness there may be, no tonic must be given until the bowels have been well opened.

Garget is inflammation or ulceration of the udder. The milk coagulates in the bag, and produces inflammation there. In an early stage, the sucking of the calf will afford the greatest relief. If this does not succeed, fomentation must be had recourse to, and friction with an unguent composed of elder-ointment with an eighth part of camphor, and mercurial ointment. To this, if necessary, iodine may succeed, but it must be a last resource, on account of its absorbent power.

The treatment of *cow-pox* will consist in fomenting the teats, applying an emollient ointment, and giving a little physic.

The diseases of the feet must not be forgotten. *Foul in the foot* consists in ulceration about the coronet or between the claws, which produces great lameness, and, occasionally, loss of the hoof. It is very contagious. The treatment is simple. Every pustule or collection of purulent matter must be opened; the horn which is separated from the parts beneath must be carefully and wholly removed; a linseed-meal poultice applied for a day or two, and then the sores touched with the *butyr of antimony*.

Mange is a too frequent and very troublesome disease among cattle. An ointment however, the basis of which is sulphur, with a small portion of mercurial ointment, daily and well rubbed on every affected part, will usually remove the complaint. Sulphur given internally will be a useful adjunct.

ASIATIC OXEN.

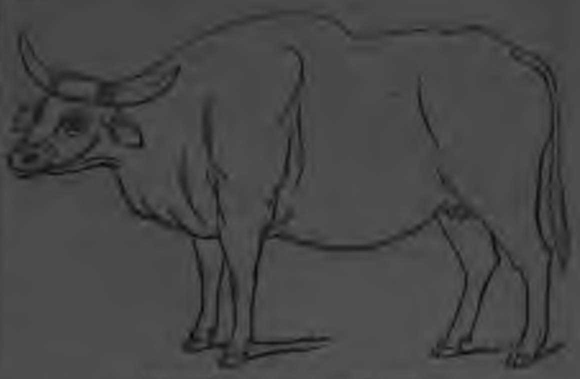
Mr. Bennett (*Gardens and Menagerie of the Zoological Society*), treating of the Indian Ox (*Bos Taurus*, var. *Indicus*), says,—'In addition to the domesticated species known by the names of Oxen, Buffaloes, and Yaks, the genus Bos comprehends several others equally distinct, which have rarely if ever been reclaimed from their native wildness. Two of these, the Bison and the Musk Ox, are peculiar to the northern regions of America; one, the Polish Aurochs, is now confined to a single European forest; a fourth, the *Arni*,* exists only in Central Asia; and a fifth, the Cape Buffalo, is, as its name imports, a native of the southern extremity of Africa. Thus it appears that in this wide dispersion of the several races, each region has preserved its own peculiar kind in its original independence; while, on the other hand, two at least of the remaining species, the Ox and Buffalo, which are no longer to be found in a state of nature, have been industriously propagated under the auspices of man, throughout almost every part of the globe. The Yak alone, of all the domestic species, remains confined within its primitive limits, in Thibet namely, and a part of Tartary, where it is said to be generally cultivated, almost to the exclusion of every other race.'

We proceed to notice first certain wild Asiatic oxen.

Bos Gavæus, *Gavaya*, Sansc.; *Gavai* or *Gayál*, Hind.; *Gobaygoya*, Beng.; *Gaujangali*, Pers.; *Mithun*, Mountaineers (Cúcis, &c.) east of Silhet; *Shiál*, Mountaineers (Cúcis) east of Chatgaon; *Tshongmoa*, Mugs; *Nówa*, Burmas; *Gauvera*, Ceylon.

Description.—Nearly of the size and shape of the English bull. It has short horns, which are distant at their bases, and rise in a gentle curve directly out and up: a transverse section near the base is ovate, the thick end of the section being on the inside. The front is broad, and crowned with a tuft of lighter coloured long curved hair. The dewlap is deep and pendant. It has no mane nor hump, but a considerable elevation over the withers. The tail is short, the body covered with a tolerable coat of straight dark brown hair; on the belly it is lighter coloured; and the legs and face are sometimes white. (Roxburgh.)

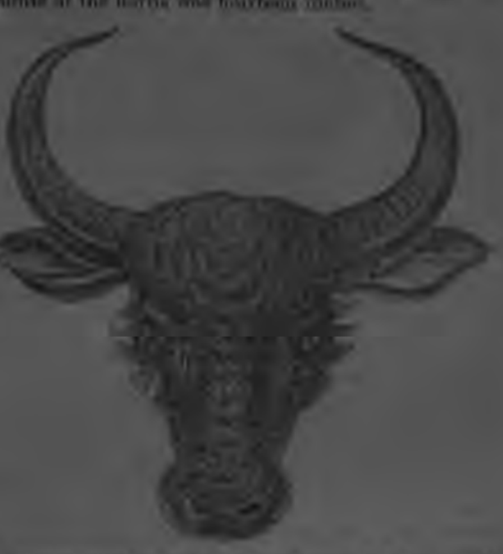
Habits, Locality, &c.—Dr. Buchanan states that the cry of the *Gayál* has no resemblance to the grunt of the Indian Ox; but a good deal resembles that of the buffalo. It is a kind of lowing, but shriller, and not near so loud as that of the European Ox. In this the *Gayál*, in Dr. Buchanan's opinion, approaches much nearer than it does to the buffalo. Mr. Macrae states that the *Gayál* is found wild in the range of mountains that form the eastern boundary of the provinces of Aracan, Chittagong (Chatgaon), Tipura, and Silhet. The Cúcis, or Lunctas, a race of people inhabiting the hills immediately to the eastward of Chatgaon, have herds of them in a domesticated state. The animal is called *Gobay* in the Hindu Sástra, but seems however to be little known beyond the limits of its native mountains, except to the inhabitants of the provinces above mentioned. The same author informs us that the *Gayál* is of a dull heavy appearance; but at the same time of a form that indicates much strength and activity, like that of the wild buffalo. Its disposition is gentle; even in the wild state on its native hills it is not considered dangerous, never standing the approach of man, much less sustaining his attack. The Cúcis hunt the wild ones for the sake of their flesh. The *Gayál* is a timid animal, and prefers the tender shoots and leaves of shrubs to grass; it never wallows in mud like the buffalo. It is domesticated by the Cúcis, but does not undergo any labour. The cow goes eleven (?) months with young, gives but little milk, and does not yield it long; but that little is remarkably rich, almost equalling cream, which it resembles in colour; the Cúcis however do not make any use of the milk, but rear the *Gayáls* entirely for their flesh and skins, of which last, or rather their hides, they form their shields. These domesticated herds roam at large in the forests near their villages during the day, but return of their own accord at evening, being early taught to do this by being fed when young every night with salt, of which these animals are very fond. The Hindus, in the province of Chatgaon, will not kill the *Gayál* (their *Gobay*), which they hold in equal veneration with the cow, but they hunt and will readily kill [illegible] (*[illegible] Gayál* or *[illegible]*) as they do the wild buffalo. The form of the animal, and the way in which it carries its head, will be understood from the following figure, which is reduced from that by a native artist, prefixed to Mr. Colebrooke's paper (*Asiatic Researches*, vol. viii.), to which we refer the reader for further interesting particulars.



The Gayál, Bos Gavæus. (Colebrooke.)

Mr. Bird proved that the Gayál will breed with the common Indian bull: he brought a domesticated female *Gayál* from Chittagong to Dacca, directed a common bull (of the breed *Gówalli*, a *Zebu* of the common kind found in the middle districts of Bengal), which the female received upon being blinded with a cloth thrown over her eyes. The offspring was a cow resembling mostly the *Gayál* mother; and from that cow, impregnated by a bull of the same common breed, another cow was produced, which also had grown up, and was in calf by a common bull when Mr. Bird wrote his account. (*Asiatic Researches*, vol. viii.)

General Hardwicke gives a figure of the head of the true wild, or as the natives term it, the *Asseel Gayál* (a female), from the south-east frontier of Bengal. The space between the points of the horns was fourteen inches.



Head of true or Asseel Gayál (female), Bos Gavæus? S. E. frontier of Bengal (from Hardwicke).

Bos Frontalis, Lambert, *The Gyall*.

Description.—Bluish-black, a grey frontal band; horns thick, remote, and short; tail rather naked, slender, and with a hairy extremity.

Mr. Lambert observes that the hair of the hide is soft; there is no crest; the lower lip is white at the apex, and bristled with hairs. The band of the *forehead*, including the bases of the horns, is lead-colour; the horns themselves are pale. Length from the tip of the nose to the end of the tail, nine feet two inches. From the tip of the hoof of the fore-foot to the top of the rising of the back, four feet one inch and a quarter. From the tip of the hoof of the hind leg to the highest part of the rump, four feet and a half.*

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* [illegible]

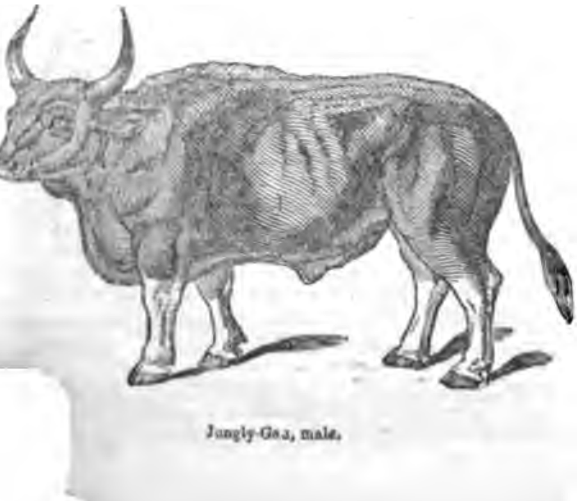
* If the figure given in 'Linn. Trans.' be correct, and great care is generally taken in this respect, there must be some error here. In the engraving the withers of the animal are considerably higher than the rump. 'Perhaps "four feet and half an inch" was meant.' Mr. Harris indeed, in his letter to Mr. Lambert, states that some parts of the drawing (which was taken in England, before the subject, which had been imported, died, and which appears to have been sent to Mr. Harris) seem to be rather too much enlarged, as for instance, the bases of the horns and the rising between the shoulders.

Mr. Harris, in his letter to Mr. Lambert, after identifying his animal with Mr. Lambert's drawing, writes thus:—'The animal * * which I have kept and reared these last seven years, and know by the name of the *Gyall*, is a native of the hills to the north-east and east of the Company's province of Chittagong, in Bengal, inhabiting that range of hills which separates it from the country of Aracan. The male Gyall is like our bull in shape and appearance, but, I conceive, not quite so tall; is of a blackish-brown colour; the horns short, but thick and strong towards the base, round which and across the frons the hair is bushy and of a dirty white colour; the chest and forehead are broad and thick. He is naturally very bold, and will defend himself against any of the beasts of prey. The female differs little in appearance; her horns are not quite so large, and her make is somewhat more slender; she is very quiet, is used for all the purposes of the dairy, as also (I have been informed by the natives) for tilling the ground, and is more tractable than the Buffalo. The milk which these cows give has a peculiar richness in it, arising, I should conceive, from their mode of feeding, which is always on the young shoots and branches of trees in preference to grass. I constantly made it a practice to allow them to range abroad amongst the hills and jungles at Chittagong during the day to browse, a keeper attending to prevent their straying so far as to endanger losing them. They do not thrive in any part of Bengal so well as in the aforementioned province and in the adjoining one, Tipperah, where I believe the animal is also to be found. I have heard of one instance of a female Gyall breeding with a common bull.'

Head of Gyall. ('Linn. Trans.')

The *Jungly-Gau, Bœuf des Jongles* of M. Duvaucel, *Bos Sylhetanus* of F. Cuvier, is considered to be identical with *Bos frontalis* of Lambert.

M. Duvaucel states that he believed for a long time that these oxen did not differ essentially from our domestic oxen, and that they were both varieties of the same species; but he had then only seen the specimens living in the menagerie at Barrackpore, whereas he had since hunted them at the foot of the Silhet mountains, and he found that they were as common and as much spread as the Buffaloes. But he adds that they seem more wild, though they are nevertheless easily domesticated, and yield abundance of the richest milk.



Jungly-Gau, male.

Bos Gour, Traill.

Dr. Traill remarks that the only animal which appears to have affinity with the *Gour* is the *Bos Gavæus* of Colebrooke, but the very different form of its head, the presence of a *distinct dewlap*, and the general habit of the *Gaijal* or *Gayâl*, distinguish it from the *Gour*. Captain Rogers assured Dr. Traill that neither the descriptions in Mr. Colebrooke's communication nor the figure of the Gayâl that accompanies them had any greater resemblance to the Gour than that general one which subsists between all the animals of this genus.

Description.—Form not so long as that of the *Urna* (*Arnee* or *Arni*). Back strongly arched, so as to form a nearly uniform curve from nose to base of tail when the animal stands still. This appearance is partly owing to the curved form of the nose and forehead, and still more to a remarkable ridge, of no great thickness, which rises six or seven inches above the general line of the back, from the last of the cervical to beyond the middle of the dorsal vertebræ,* from which it gradually is lost in the outline of the back. It was very conspicuous in the Gours of all ages, although they were loaded with fat; and has no resemblance to the bunch which is found on some of the domestic cattle of India. It bears some resemblance to the ridge described as existing in the Gayal, but the *Gour* is entirely without a dewlap, of which there is no trace in either sex at any age. End of the tail bushy.

Colour.—Very deep brownish-black, almost approaching to bluish-black, except a tuft of curling dirty white hair between the horns, and rings of the same colour just over the hoof. Hair of the skin short and sleek, having somewhat the oily appearance of a fresh seal-skin. (Traill.)

The shape of the horns will be best understood by reference to the cut; when polished, they are of a horn-grey colour with black solid tips. A pair in Dr. Traill's possession measured one foot eleven inches along their convex sides, and one foot in their widest circumference.

The size of the animal is considerable. Dr. Traill gives the dimensions of one *not fully grown*, which measured from tip of nose to end of tail 11 feet 11¾ inches; from the hoof to the withers 5 feet 11¾ inches; and from the withers to the sternum 3 feet 6 inches. 'The limbs have more of the form of the deer than any other of the bovine genus.'

Locality, Habits, Chace, Reproduction, &c.—The *Gour*, according to Captain Rogers, occurs in several mountainous parts of Central India, but is chiefly found in Myn Pât, or Mine Paut, a high insulated mountain with a tabular summit, in the province of Sergojah, in South Bahar. 'This table-land is about thirty-six miles in length by twenty-four or twenty-five miles in medial breadth, and rises above the neighbouring plains probably 2000 feet. The sides of the mountain slope with considerable steepness, and are furrowed by streams that water narrow valleys, the verdant banks of which are the favourite haunts of Gours. On being disturbed they retreat into the thick jungles of *Saul-trees* which cover the sides of the whole range. The south-east side of the mountain presents an extensive mural precipice from twenty to forty feet high. The rugged slopes at its foot are covered by impenetrable green jungle, and abound with dens formed of fallen blocks of rock, the suitable retreats of tigers, bears, and hyænas. The western slopes are less rugged, but the soil is parched, and the forests seem withered by excess of heat. The summit of the mountain presents a mixture of open lawns and woods. There were once twenty-five villages on Myn Pât, but these have been long deserted on account of the number and ferocity of the beasts of prey. On this mountain however the Gour maintains his seat. The Indians assert that even the tiger has no chance in combat with the full-grown Gour, though he may occasionally succeed in carrying off an unprotected calf. The wild Buffalo abounds in the plains below the mountains, but he so much dreads the Gour, according to the natives, that he rarely attempts to invade its haunts; and the hunting-party only met with three or four urnas on the mountain. The forests which shield the Gour abound however with Hog-deer, Saumurs (Sambur deer), and Porcupines.' Captain Rogers, who furnished the above account, hunted the Gour in these wild and romantic retreats, and the animal, it appears, when he faces his adversary ready to do battle. A short bellow, imitated best by the syllables *Ugh-ugh*, was the only cry heard from the Gour, and that not until after it had been wounded. August is the month in which the calf is generally dropped, and the period of gestation is twelve months. The large quantity of milk given by the cow is averred to be occasionally so rich as to cause the calf's death. The first year, the native name of the bull-calf is *Purorah*; the cow-calf is called *Pureeah*; and the full-grown cow *Gudrin*. The Gours herd together in parties varying from ten to twenty; they browse on the leaves and tender shoots of trees and shrubs, and also graze on the banks of the streams. In the cold weather the *saul* forests are their places of concealment, and the heats bring them out to feed in the green lawns and valleys. They do not, it seems, wallow in swamp and mire like the Buffalo. If the natives are to be credited, the Gour will not brook captivity; even if taken very young, the mountain-calf droops and dies. (*Edinburgh Philosophical Journal*, vol. xi.)'

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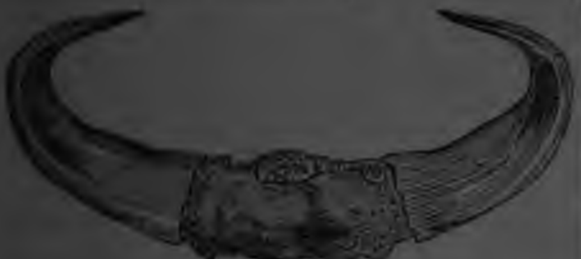
* M. Lesson observes that M. Geoffroy found a row of accessory apophyses (*apophyses montantes suradnesées*), which are the cause of the vaulted back, and called by M. Geoffroy *pro-épial* and *ex-épial*.

General Hardwicke (*Zoological Journal*, vol. iii.) gives a figure of a pair of horns of the '*Bos Gour* or wild bull of the mountainous district of Ramgurh, and table-land of Sirgoojah,' from which our cut is taken. The gour to which they belonged was killed, as General Hardwicke believed, by the same hunting-party described by Captain Rogers, and they were presented to the General by the principal member of that party, the late Major Roughsedge. These horns were 15 inches between the tips.

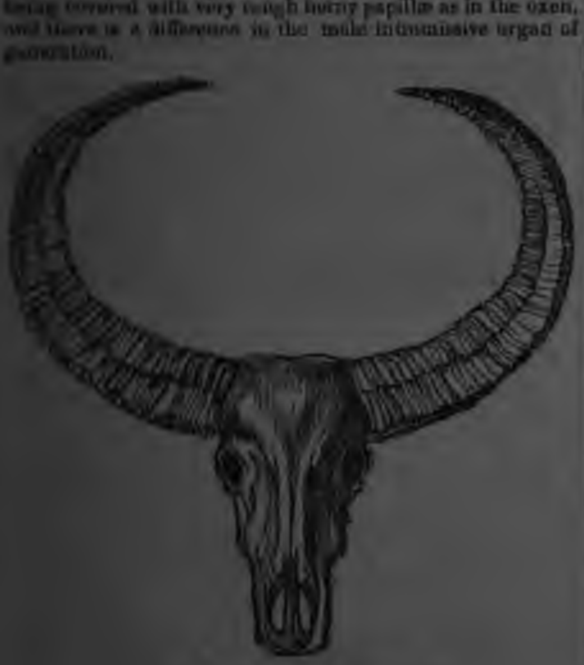


Horns of Gour. (Hardwicke.)

Bos Bubalus; *Le Buffle* of Buffon; *Le Buffle d'Italie* of F. Cuvier.

Description.—Front elevated, and rounded, so that the chanfrein has a concave appearance; horns black, separated widely from each other, with a projecting ridge anteriorly; dewlap but little developed; tail long and pendant; hide black, the hairs stiff and not numerous.

The tongue is very smooth in the buffaloes, instead of being covered with very rough horny papillæ as in the oxen, and there is a difference in the male intromissive organ of generation.



Skull and Horns of the Arnee.

The female buffalo goes longer with young than the cow; their milk is excellent, and they may be milked in the same way as a cow, notwithstanding some tales to the contrary.

Habits.—The buffalo is wild and fierce, lives in large herds in moist and marshy places, and delights to roll in the mire.

Geographical Distribution.—Asia generally, Africa, and southern Europe. In Italy, where it was introduced, it exists in the Pontine marshes.

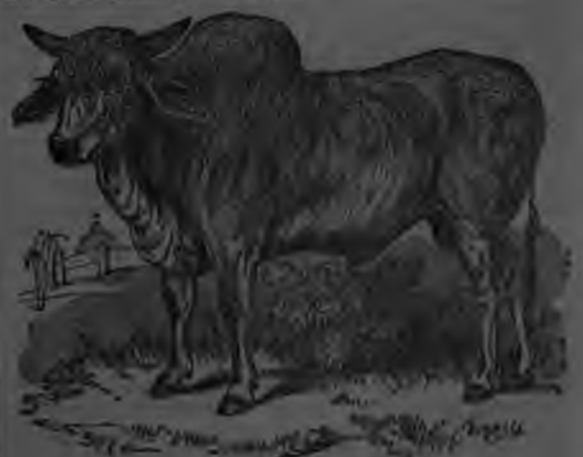
The *Bos Arni* of Shaw and others, the *Arnee* or *Urna*, no longer holds a place as a species, being considered, on good evidence, a variety of *Bos Bubalus*. Mr. Colebrooke, in his interesting paper on the Gayal (*Bos Gavæus*) above noticed, says, 'The Bos Arnee of Kerr and Turton, notwithstanding the exaggerated description given on the authority of "a British officer who met with one in the woods in the country above Bengal," is evidently nothing else but the wild buffalo, an animal very common throughout Bengal, and known there and in the neighbouring provinces of Hindustan by the name of *Arna*.' 'Though neither fourteen feet high, as Mr. Kerr has stated, or rather as the officer on whose information he relied, had affirmed; nor even eight feet, as Dr. Turton, following Kerr's inference from a drawing, asserts; yet it is,' says Mr. Colebrooke, 'a large and very formidable animal, conspicuous for its strength, courage, and ferocity.' (*As. Res.*, vol. viii.)

The domesticated Asiatic oxen, or zebus, vary much in their size and the direction of their horns, but are generally distinguished by a fatty elevated hump below the neck and over the withers. They are to be found in the catalogues under the names of *Bos Indicus*, Erxl., and (more correctly) *Bos Taurus*, var. *Indicus*, Desm. and others.

The horns of some are short and suberect (Indian ox), in others comparatively long and pointed backwards, with an inclination to curve inwards, as in the more common breeds (Zebu). The ears of some are of ordinary size and position (Zebu); in others pendulous (Indian ox). The dewlap is more or less developed, in some very largely. Their colour varies from a light ashy grey to a milk white, and their size from the stature of an ordinary bull to that of a large mastiff. Many of these varieties may be seen in the gardens of the Zoological Society in the Regent's Park. The limbs of all are deer-like and elegant. They 'are spread,' says Mr. Bennett, 'over the whole of Southern Asia, the islands of the Indian Archipelago, and the eastern coast of Africa, from Abyssinia to the Cape of Good Hope.'

In many parts of India the Zebu is placed under the saddle or harnessed to a carriage, and travels at an easy rate. It must have lost much of its fleetness, if the more antient writers are to be credited; for they speak of fifty or sixty miles a day as its usual pace, whilst the moderns only allow it twenty or thirty. The beef is not bad, but is neither so sweet nor so good as that of the common ox, the hump always excepted, which when well cooked is very delicate.

The Zebus bear a charmed life among the Hindus, who venerate them and hold their slaughter to be a sin; though they do not object to work them. There are however some particularly sanctified zebus who lead an easy life, wandering about the villages at their ease, and taking their pleasure and their food where they list, if not prevented by the contributions of the devout.

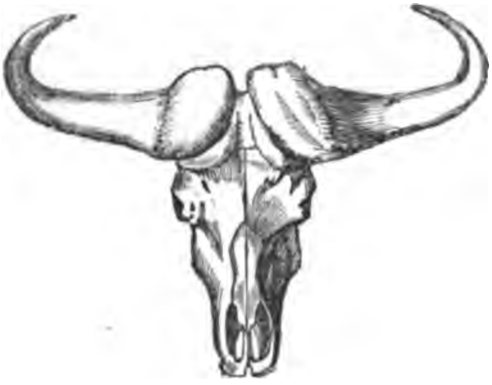


Indian Ox (large variety).

AFRICAN OXEN.

Bos Caffer. The Cape Buffalo.

Description.—Horns black, extremely large and flattened at their base, where they cover the front, having a direction from within outwards and downwards, and then again elevated at their point; ears rather pendant and covered by the horns; dewlap large and pendant; skin with harsh hairs an inch long of a deep brown or black colour. Size great, and proportions massive.



Skull of Bos Caffer.

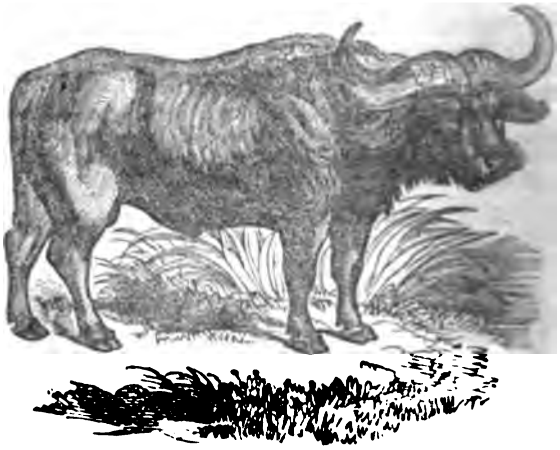
Locality.—South Africa.

Habits, &c.—The Cape buffalo congregates in large herds. Thunberg and his companions came suddenly upon a mass of five or six hundred, which were grazing in a plain skirted by a wood. The beasts did not see the intruders till they came within three hundred paces, when the whole herd lifted their heads and stood at a gaze. After a while the buffaloes stooped their heads again to feed, and six of the party (three Europeans and three Hottentots), who carried muskets and were accompanied by others armed with javelins, marched up to them within forty paces, when the herd again lifted their heads and were saluted with a volley, which instantaneously dispersed them, leaving their wounded to follow as they could. One of these, an old bull, made the travellers fly, but fell before he reached the wood. This beast was very thick in the body, with short legs, of a dark grey colour, and almost destitute of hairs. But if a herd may be approached thus safely, a single outlying bull or a wounded one appears to be a most formidable antagonist. The author last quoted was botanising in a wood rather behind his companions, when Auge, the gardener of the expedition, who went first, suddenly encountered a large old male buffalo, which was lying down quite alone in a spot of a few square yards free from bushes. No sooner did the beast discover the poor gardener, than he rushed upon him with a terrible roar. Auge turned his horse short round behind a great tree, so as in some measure to get out of the sight of the buffalo, which now charged straight towards the serjeant who followed, and gored his horse in the belly so terribly that it instantly fell on its back, with its feet turned up in air and its entrails hanging out, in which state it lived almost half an hour. In the mean time the gardener and serjeant had climbed up into trees for safety. Thunberg, intent upon his botanising, and with his ears filled with the rustling of the branches, in the narrow pass where he was, against his saddle and baggage, heard nothing of all this, though so near. But the buffalo had not done yet. The serjeant had brought two horses with him for his journey. One of them, as we have seen, had been already despatched; the other now stood just in the way of the buffalo as he was going out of the wood. As soon as the infuriated beast saw this second horse, he attacked it so furiously, that he not only drove his horns into the horse's breast and out again through the very saddle, but threw it to the ground with such violence that it instantly expired, and all the bones of its body were broken. Just as the buffalo was thus engaged with this last horse, Thunberg came up to the opening and beheld the frightful scene. The wood was so thick that he had neither room to turn his horse round, nor to get on one side; he therefore was obliged to take refuge upon a tree into which he climbed, leaving his horse to its fate. But the buffalo had satiated his rage or did not distinctly see the new object, for after his second exploit, he turned suddenly round and went off. Thunberg found his companions half dead with fear, indeed the gardener was so affected that he could scarcely speak for some days after, and the two surviving horses were discovered shivering with fear, and unable to make their escape. (*Travels.*)

Sparrman (*Voyage to the Cape*, vol. ii.) gives a graphic description of the shooting of one, and of the unconquerable spirit of the animal even in death. We can only find room for the final act of the tragedy. 'During his fall, and before he died,' writes Sparrman, 'he bellowed in a most stupendous manner; and this death-song of his inspired every one of us with no small degree of joy, on account of the victory we had gained: and so thoroughly steeled frequently is the human heart against the sufferings of the brute creation, that we hastened forwards, in order to enjoy the pleasure of seeing the buffalo struggle with the pangs of death. I happened to be the foremost amongst them; but think it impossible ever to behold anguish, accompanied by a savage fierceness, painted in stronger colours than they were in the countenance of this buffalo. I was within ten steps of him, when he perceived me, and, bellowing, raised himself suddenly again on his legs. I had reason to believe since, that I was at the time very much frightened; for before I could well take my aim, I fired off my gun, and the shot missed the whole of his huge body, and only hit him in the hind-legs, as we afterwards discovered by the size of the ball. Immediately upon this I fled away like lightning, in order to look out for some tree to climb up into.' The same author gives the following as the measurement of a buffalo. Length 8 feet, height 5½ feet, and the forelegs 2½ feet long: the larger hoofs 5 inches over. The distance between the points of the horns he states to be frequently 5 feet. They are black, and the surface, to within about a third part of them, measured from the base, is very rough and craggy. A very lively account of a buffalo-hunt is also given by Bruce. He guesses the weight of a bull that he assisted in killing at nearer fifty than forty stone. The horns from the root, following the line of their curve, were about 52 inches, and nearly nine where thickest in circumference.

The Cape buffalo delights in wallowing in the mire, and when heated by hunting throws himself into the first water he reaches.

The flesh is described by some as good and high flavoured, by others as ill-grained and coarse: the difference in these accounts is probably to be traced to the sex, age, and condition of the animals eaten. The rhinoceros-like hide is much sought after for harness, &c.



Bos Caffer.

The horns of the domesticated oxen of the Cape grow to an enormous size.

AMERICAN OXEN

Bison.

Bison Americanus. (See the article BISON.)

Our readers have only to open almost any one of the numerous books of South American Travels for an account of the wild or half-wild cattle, and the mode of capturing and slaughtering them. Mr. Darwin (*Journal of Researches in Geology and Natural History*, 8vo. London, 1839) informs us that the great *corral* at Buenos Ayres, 'where the animals are kept for slaughter to supply food to this beef-eating population, is one of the spectacles best worth seeing. The strength of the horse, as compared to that of the bullock, is quite astonishing: a man on horseback having thrown his lazo round the horns of a beast, can drag it anywhere he chooses. The animal having ploughed up the ground with outstretched legs in vain efforts to resist the force, generally dashes at full speed to one side; but the horse immediately turning to receive the shock, stands so firmly, that the bullock is almost thrown down, and one would think, would certainly have its neck dislocated. The struggle is not however one of fair strength, the horse's girth being matched against the bullock's extended neck. In a similar manner a man can hold the wildest horse, if caught with the lazo just behind the ears. When the bullock has been dragged to the spot where it is to be slaughtered, the *matador* with great caution cuts the hamstrings. Then is given the death-bellow; a noise more expressive of fierce agony than any I know: I have often distinguished it from a long distance, and have always known that the struggle was then drawing to a close. The whole sight is horrible and revolting: the ground is almost made of bones; and the horses and riders are drenched with gore.' The same interesting writer gives an account of the chase of a wild fat cow in the Falkland Islands with the *bolas* and *lazo*, nor does he forget to celebrate the delicious supper of 'carne con cuero' which it afforded him. A large circular piece was taken from the back, roasted on the embers with the hide downwards, and in the form of a saucer, so that none of the gravy was lost. The flesh thus treated was as superior to common beef as venison is to mutton.

Ovibos.

Generic Character.—Horns very wide, and touching each other at their base, then applied to the sides of the head, and having the points suddenly turned up. No naked muzzle; but no furrow on the upper lip. Chaffron narrow at the end, very square, resembling that of the sheep. Ears short. Limbs robust. Tail very short.

Musk Ox (*Ovibos moschatus*).

Ovibos moschatus.

Description.—Size of Highland cattle. Horns broad at origin, covering the brow and whole crown of the head, and touching each other throughout from before backwards. As each horn rises from its fairly convex base, it becomes round and tapering, curving directly downwards between the eye and the ear, until it reaches the angle of the mouth, when it turns upwards in the segment of a circle to above the level of the eye; for half its length it is dull, white, and rough, and beyond smooth and shining; near the point it becomes black.

General colour of the hair brown, long, matted, and rather curled on the neck and between the shoulders, where it is rather crested; on the back and hips long but lying smoothly. On the shoulders, sides, and thighs it is so long as to hang down below the middle of the leg. There is on the centre of the back a mark of a soiled brownish white, called by Captain Parry the saddle. On the throat and chest the hair is very straight and long, and, together with the long hair on the lower jaw, hangs down like a beard and dewlap. The short tail is concealed by the fur of the hips. There is a large quantity of fine brownish ash-coloured wool or down among the hair covering the body. The hair on the legs is short, dull brownish-white, unmixed with wool. The hoofs are longer than those of the *Caribou*, but so similar in form that it requires the eye of a practised hunter to distinguish the impressions. In the cow, which is smaller than the bull, the horns are smaller, and their bases, instead of touching, are separated by a hairy space. The hair on the throat and chest is also shorter. (Richardson.)

This is the *Bœuf musqué* of Jérémie; *Musk Ox* of Drage, Dobbs, Ellis, Pennant, Hearne, and Parry; *Bos moschatus* of Gmelin, Sabine, and Richardson (Parry's 'Second Voyage'); *Matèeh-moostoos* (ugly bison) of the Cree Indians; *Adgiddah-yawseh* (little bison) of the Chepewyans and Copper Indians; and *Oomingmak* of the Esquimaux. (Richardson.)

Geographical Distribution.—The barren lands of America lying to the northward of the 60th parallel. Tracks were once seen by Hearne within a few miles of Fort Churchill, in lat. 59°; and he saw many in his first northern journey, in about lat. 61°. Dr. Richardson was informed that they do not now come so far to the southward even on the Hudson's Bay shore; and he adds that farther to the westward they are rarely seen in any numbers lower than lat. 67°, although from portions of their skulls and horns, which are occasionally found near the northern borders of the Great Slave Lake, he thinks it probable that they ranged at no very distant period over the whole country lying between that great sheet of water and the Polar Sea. He had not heard of their having been seen on the banks of Mackenzie's River to the southward of Great Bear Lake, and he states that they do not come to the south-western end of that lake, although they existed in numbers on its north-eastern arm. 'They range,' continues the Doctor, 'over the islands which lie to the north of the American continent, as far as Melville Island, in lat. 75°, but they do not, like the rein-deer, extend to Greenland, Spitzbergen, or Lapland. From Indian information we learn that to the westward of the Rocky Mountains, which skirt the Mackenzie, there is an extensive tract of barren country, which is also inhabited by the musk-ox and rein-deer. It is to the Russian traders that we must look for information on this head; but it is probable that, owing to the greater mildness of the climate to the westward of the Rocky Mountains, the musk-ox, which affects a cold barren district, where grass is replaced by lichens, does not range so far to the southward on the Pacific coast as it does on the shores of Hudson's Bay. It is not known in New Caledonia nor on the banks of the Columbia, nor is it found on the Rocky Mountain ridge at the usual crossing places near the sources of the Peace, Elk, and Saskatchewan rivers. It is therefore fair to conclude that the animal described by Fathers Marco de Niza and Gomara as an inhabitant of New Mexico, and which Pennant refers to the musk-ox, is of a different species. The musk-ox has not crossed over to the Asiatic shore, and does not exist in Siberia, although fossil skulls have been found there of a species nearly allied, which has been enumerated in systematic works under the name of *Ovibos Pallantis*. The appearance of musk-oxen on Melville Island in the month of May, as ascertained on Captain Parry's first voyage, is interesting, not merely as a part of their natural history, but as giving us reason to infer that a chain of islands lies between Melville Island and Cape Lyon, or that Wollaston and Banks' Lands form one great island, over which the migrations of the animals must have been performed. The districts inhabited by the musk-ox are the proper lands of the Esquimaux; and neither the northern Indians nor the Crees have an original name for it, both terming it Bison with an additional epithet.'

Habits, Chase, Utility, &c.—Dr. Richardson, who had the best opportunities of coming at the truth, informs us that the country frequented by the musk-ox is mostly rocky and destitute of wood, except on the banks of the larger rivers, which are more or less thickly clothed with spruce trees. Their food, he tells us, is similar to that of the *Caribou* [DEER, vol. viii., p. 355], grass at one season and lichens at another; and the contents of its paunch are eaten by the natives with the same relish as that with which they devour the 'nerrooks' of the Caribou. The dung is voided in round pellets, which are larger than those which come from the Caribou. The animal runs fast, short as are its legs, and hills and rocks are easily climbed by this ox of the northern deserts. One pursued by Dr. Richardson's party on the banks of the Copper-mine River scaled a lofty sand-cliff with so great a declivity, that they were obliged to crawl on hands and knees to follow the chase. The musk-oxen assemble in herds of from twenty to thirty, are in their rut about the end of August and beginning of September, and bring forth one calf about the latter end of May or beginning of June. Hearne accounts for the few bulls which are seen by supposing that they kill each other in their contests for the cows.

Dr. Richardson thus graphically describes the terror of a huddled herd. 'If the hunters keep themselves concealed when they fire upon a herd of musk-oxen, the poor animals mistake the noise for thunder, and, forming themselves into a group, crowd nearer and nearer together as their companions fall around them; but should they discover their enemies by sight, or by their sense of smell, which is very acute, the whole herd seek for safety by instant flight. The bulls however are very irascible, and, particularly when wounded, will often attack the hunter, and endanger his life unless he possesses both activity and presence of mind. The Esquimaux, who are well accustomed to the pursuit of this animal, sometimes turn its irritable disposition to good account; for an expert hunter having provoked a bull to attack him, wheels round it more quickly than it can turn, and by repeated stabs in the belly puts an end to its life.'

Mr. Jeremie, who first brought the animal into notice, carried some of its wool to France, where some stockings were made of it, said to have been equal to the finest silk. Dr. Richardson says that this wool resembles that of the Bison, but is perhaps finer, and would, in his opinion, be highly useful in the arts, if it could be procured in sufficient quantity. The same author informs us that when the animal is fat, its flesh is well tasted, and resembles that of the Caribou, but has a coarser grain. The flesh of the bulls is high flavoured, and both bulls and cows, when lean, smell strongly of musk, their flesh at the same time being very dark and tough, and certainly far inferior to that of any other ruminating animal in North America. The carcass of a musk-ox weighs, exclusive of the offal, about three hundredweight, or nearly three times as much as a Barren-ground caribou, and twice as much as one of the woodland caribou. (*Fauna Borealis-Americana.*)

Utility to Man.—The true oxen hold the first rank among the animals which are useful to man. The domesticated varieties, in their life and in their death, minister largely to his wants. From the earliest times we find it in the homestall; and there is scarcely a part of the animal, from horn to hoof, when dead, that is not available for his use. It is not then a subject of wonder that in the dark ages the ox should have been considered as the representative of the Deity, and that India and Egypt should have venerated the form as that of a god.

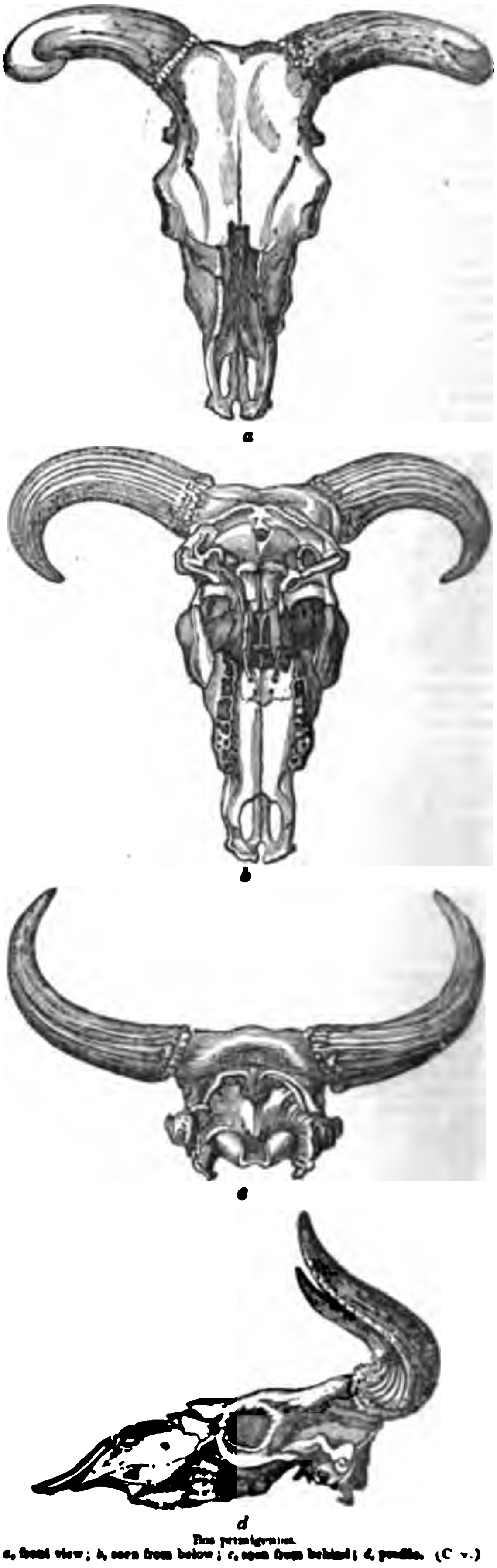
FOSSIL OXEN.

Remains of oxen and deer occur abundantly in the third and fourth periods of the tertiary series (Pliocene of Lyell), with extinct species of existing genera of Pachydermata, such as elephant, rhinoceros, hippopotamus, and horse, and the extinct genus Mastodon; and large *Carnivora*, *e.g.* tiger, hyæna, and bear.

At the head of these we must place *Bos primigenius*.

Mr. Woods, in the paper which we have above alluded to, remarks that 'it has occasioned some speculation among zoologists to appropriate to the large herbivorous animals, of which these skulls and scattered bones are now the only vestiges, their proper place in the system of nature. Cuvier however has fixed their characters, and has declared them to resemble the skulls of the present oxen so closely, that there can be little doubt of their having belonged to the stock from which the latter have all proceeded; these having however degenerated in size, and varied from them and from each other in minor points, owing to differences in climate, food, and other causes depending upon domestication, their magnitude is at least one-third greater than that of the largest breed of modern oxen, and their horns are much more massive.'

'The species with which they have been usually confounded is the Aurochs of Germany (Urus of the antients).



Bos primigenius.
a, front view; *b*, seen from below; *c*, seen from behind; *d*, profile. (C v.)

still found wild in some parts of north-western Europe, particularly the forests of Lithuania, &c.; but our admirable author has so clearly demonstrated the difference between the two, that the question, one would imagine, had long since been set at rest; yet in a comparatively recent work—a translation of the Baron's *Règne Animal*, with additions—the writer on the genus Bos has in a great measure again confounded these species, by applying to one, all that is supposed to have been related of the other; and to confirm the error, in the synopsis appended to the work, the domestic ox is actually made a mere variety of the *bos urus*—the aurochs, or bison.

'Cuvier thus carefully marks the distinction between the species: "The forehead of the ox is flat and a little concave; that of the aurochs protuberant, although less so than the buffalo's; the forehead is square in the ox, its height, taking its base between the orbits, being very nearly equal to its breadth; in the aurochs it is much wider than high, in the proportion of 3 to 2. The horns are attached in the ox to the extremities of a salient line, the most elevated of the head, that which separates the occiput from the forehead; in the aurochs this line is placed two inches farther backward than the roots of the horns: in the ox the plane of the occiput makes an acute angle with that of the forehead; in the aurochs this angle is obtuse: finally, the plane of the occiput is square in the ox, but represents a half circle in the aurochs." These characters,' continues our author, 'are constant in all the domestic races of every country.' And Mr. Woods further quotes from the 'Ossemens Fossiles' of Cuvier, who says, 'All the characters which I have assigned to the living oxen are united in the skulls of the fossil species, and I have no doubt but that they appertain to a wild race, very different from the aurochs, and which has been the true stock of our domestic oxen, a race which has been annihilated by civilization, as are those of the camel and dromedary.' The cores of the horns of the fine specimen found at Melksham and described by Mr. Woods measured, in their widest expansion, four feet within half an inch. The cranium, which consisted of the frontal bone, with the cores of the horns attached, perfect from their base to their extremities, the temporal, molar, ethmoid, sphenoid, upper maxillary, and occipital bones, with nearly all their various processes and condyles, weighed 63 lbs. Large as these dimensions are, specimens have been found exceeding this cranium in size.

Widely spread in Europe in the 'diluvium' bone-caves and bone breccias.

The following fossil species have been also named:—*Bos Trochoceros* (Hermann von Meyer), subapennine beds; *Bos (Bison) priscus* (Bojanus), *Buffle fossile de Siberie* (Cuv.), *Bos latifrons* (Harlan), *Broad-headed fossil Bison* and *Bison fossilis*, 'diluvium' of Europe and North America, bone caves and bone breccias; *Bos (Bison?) bombifrons* (Harlan), Big bone-lick, North America; *Bos Pallasii* (Dekay), *Bos moschatus fossilis? Bos canaliculatus* (Fischer)? Siberia and North America; *Bos velaunus* (Robert), Cussac, Haute Loire.

Abundant remains of ox were found by Capt. Cautley in the Sewalik Mountains, at the southern foot of the Himalaya, between the Sutlej and the Ganges, partly lying on the slope among the ruins of fallen cliffs, and partly in situ in the sandstone, in company with the bones of mastodon, elephant, rhinoceros, hippopotamus, hog, horse (comparatively scarce), elk, deer, several varieties; carnivora, ursus and felinæ (comparatively scarce); crocodile, gavial, emys, trionyx, and fishes. There were also portions of undescribed mammalia.

⁂ We now proceed to give a sketch of the views of zoologists with regard to the animals which belong to the *Bovidæ*.

The Linnæan genus *Bos*, in the last edition of the 'Systema Naturæ,' as it was left by its great author, comes next to *Ovis*, and is the last of the *Pecora*. It consists of the following species:—*Taurus*, with its varieties, including *Cæsar's Urus*; *Bonasus*; Bison and its variety, *Bison Americanus*; *Grunniens* (Yak); *Bubalis* (Bubalus of Ray, Buffalo of Asia and Italy); and *Indicus* (Zebu), with *Bubalus Africanus* as a variety.

In Illiger's system, the order *Bisulca*, consisting of the families *Tylopoda* (Camels), *Devexa* (Camelopard), *Capreoli* (Cervus and Moschus), and *Cavicornia* (Antilope, Capra, and Bos), stands between the *Solidungula* (Horse) and the *Tardigrada* (Sloths).

Cuvier, like Linnæus, places *Bos*, consisting of the *True Oxen* and the *Musk-Ox* (Ovibos), next to *Ovis*, and at the end of the Ruminants.

Mr. Gray makes the *Bovidæ* the first family of his fifth order, *Ungulata* of Ray, and divides that family as follows:—

† Horns persistent.

1. Bovina. Bos, Linn.; *Ovis*, Linn.; *Capra*, Linn.; *Antilocapra*, Ord.; *Antilope*, Brisson; *Catoblepas*, Gray.
2. Camelopardina. *Camelopardalis*, Linn.

†† Horns none or deciduous.

3. Camelina. *Camelus*, Linn.; *Auchenia*, Illiger.
4. Moschina. *Moschus*, Linn.; *Memina*, Gray.
5. Cervina. *Muntjacus*, Gray; *Cervus* and *Capreolus*, Gesner; *Axis*, Blainv.; *Cervus*, Linn.; *Dama*, Gesner; *Tarandus*, Pliny; *Alce*, Pliny.

Fischer (J. B.) arranges *Bos* at the end of the Ruminants, placing it next to *Capra*.

Col. Hamilton Smith, who has paid great attention to the family, has published his views, which are well worthy of the attention of zoologists, in Griffith's 'Cuvier,' to which we refer the reader. Mr. Swainson has adopted them in great measure.

The latter zoologist (1836) makes the *Bovidæ*, his first family of the *Ruminantes*, or ruminating quadrupeds, consist of the following genera:—*Catoblepas, Ovibos, Bos, Bubalus, Bison, Taurus*, Sm.; *Anoa*, Sm.; indeed the initial letters of Col. Smith's name stand at the end of each of the genera. The genus *Anoa* is placed by Col. Smith under his family *Capridæ*, a situation which Mr. Gray also assigns to it.

Mr. Ogilby's *Bovidæ* form the fifth and last family of the Ruminants, and include the following genera:—*Tragulus, Sylvicapra, Tragelaphus, Calliope, Kemas, Capricornis, Bubalus, Oryx, Bos* (type *Bos Taurus*). The genus *Ovibos* is arranged by him under the preceding family, *Capridæ* (*Zool. Proc.*, 1836.)

OX-EYE. [Titmice.]

OXALIC ACID. This acid was discovered by Scheele, in 1776. It occurs in several plants, as in the wood sorrel (*Oxalis acetosella*), and in common sorrel (*Rumex acetosa*). In the juice of these plants, and in the roots of rhubarb, bistort, gentian, &c., it is combined with potash; in several kinds of lichens, it is found in union with lime. It occurs as a mineral compound also, in combination with oxide of iron, and is called *Humboldtite*. It is an ingredient also of several urinary calculi.

Oxalic acid may be obtained by several processes: first, by decomposing the natural superoxalate of potash, or salt of sorrel, by means of acetate of lead, sulphuric acid, &c.; but it is best obtained by heating organic matter, such as sugar or potato starch, with nitric acid in a retort. Having been first obtained from sugar, it received the name of *saccharine acid*. Indeed most organic compounds which contain much carbon and no azote, may be converted into oxalic acid by the action and decomposition of the nitric acid; and hydrate of potash, in some cases, produces similar results. When nitric acid acts upon sugar or starch, it is decomposed, and yields nitric oxide gas in great quantity; the oxygen of the decomposed acid uniting with the carbon of the vegetable matter, converts it into oxalic acid: the crystals first obtained are to be dissolved in water and re-crystallized to render them perfectly pure.

The properties of oxalic acid are, that its crystals are prismatic, colourless, and transparent; the primary form is a right rhombic prism. Their taste is extremely sour, and they are very poisonous; when dissolved in 200,000 times their weight of water, the solution reddens litmus paper. When this acid is exposed to a dry air, it effloresces, losing water of crystallization; it dissolves in 15 parts of water at 50°, and in 9 parts at 60°; at 212° it melts in its water of crystallization; it is soluble also in alcohol, but less so than in water.

Oxalic acid consists of, in its anhydrous state,—

Three equivalents of oxygen .	24
Two equivalents of carbon .	12
	—
Equivalent . .	36

So that it is equal to

1 equiv. of carbonic oxide .	14 =	8 oxygen	+ 6	carbon.
1 ditto of carbonic acid .	22 =	16 ,,	+ 6	,,
	—			
	36			

No means have yet been discovered of forming oxalic acid by combining carbonic oxide and carbonic acid; but when oxalic acid is heated with sulphuric acid, it resolves into these substances entirely and in the proportions stated, the water of crystals combining with the sulphuric acid.

Oxalic acid, in the state of crystals, consists of one equivalent of acid 36 + three equivalents of water 27=63: this water cannot be totally expelled by heat; the acid, unless combined with a base, always retains one equivalent of water.

Oxalic acid is to a certain extent volatile, and Mr. Faraday has shown that sublimation takes place even at common temperatures; at 212° the volatilization is much more considerable; and when deprived of two-thirds of its water of crystallization, it sublimes rapidly and without decomposing; the sublimed acid is crystalline, and contains one equivalent of water.

When oxalic acid retaining the whole of its water of crystallization is suddenly heated up to about 300°, it yields carbonic acid, carbonic oxide, formic acid, and water.

Oxalic acid forms compounds with bases, which are termed oxalates, and of these we shall describe some of the more important.

Oxalate of Ammonia.—This salt is prepared by adding the sesquicarbonate of ammonia to a solution of the acid, to saturation. The solution by evaporation readily yields slender colourless prismatic crystals, the primary form of which appears to be a right rhombic prism. They are inodorous, but have a sharp saline taste. One hundred parts of cold water dissolve 4·5 parts of this salt; in hot water it is much more soluble. Alcohol does not take it up. When decomposed by heat, it yields a peculiar compound. [OXAMIDE.] This salt is composed of

One equivalent of oxalic acid	.	36
One equivalent of ammonia	.	17
One equivalent of water .	.	9
		—
Equivalent .	.	62

It is employed in solution as a test of the presence of lime.

Binoxalate of Ammonia may also be formed, but it is not of importance.

Oxalate of Potash.—Oxalic acid forms three salts with potash: the *neutral oxalate* is obtained by saturating the acid with the alcali. It crystallizes in flat rhombic crystals, which are so very soluble in water, that even when cold it takes up half its weight. When a solution of oxalic acid is added to this, precipitation of a less soluble supersalt occurs. It is composed of

One equivalent of oxalic acid	.	36
One equivalent of potash	.	48
One equivalent of water	.	9
		—
Equivalent	.	93

Binoxalate of Potash may be prepared either by dissolving the requisite quantities of acid and alkali in water, or, as above mentioned, by adding oxalic acid to the neutral salt. It forms small rhombic crystals, which have a bitterish taste and an acid reaction, and they are soluble in about 10 times their weight of cold water. This salt, mixed with the quadroxalate, exists in *oxalis acetosella*, and they constitute the compound known by the name of the *salt of sorrel*, employed for removing ink-spots.

Quadroxalate of Potash may be formed by digesting the binoxalate in hydrochloric acid, which taking half the potash, the remainder becomes quadroxalate. The crystals are prismatic, and are as little soluble in water as those of the binoxalate.

The oxalates of potash are all converted by a red heat into carbonate of potash; their composition was first ascertained and pointed out by Dr. Wollaston as affording one of the most remarkable series of proofs of the doctrine of multiple proportions.

Oxalate and Binoxalate of Soda may be formed, but they are not employed.

Oxalate of Lime is a very insoluble compound, and hence oxalic acid and lime, with certain restrictions, are used as tests of each other's presence. Barytes and strontia also form insoluble compounds with oxalic acid. Such metallic ates as are important are noticed under the respective

XALIC ACID, the most highly oxygenated of all the table acids, is also the most rapid and certainly fatal of any which are capable of being crystallized. As the crystals are not unlike those of the sulphate of magnesia, or Epsom salts, mistakes between the two are of very frequent occurrence. Being likewise much used in the arts, and commonly known by the name of *acid of sugar*, it is taken either accidentally, or under the supposition that it is akin to sugar, and therefore pleasant and innocent.

To prevent confusion of the crystals of this formidable acid with those of the sulphate of magnesia, it has been proposed that the former should be coloured while in the course of preparation, an expedient which has not been adopted. But on the other hand, the crystals of Epsom salts have been manufactured of a different shape by a peculiar process of crystallization. The taste is very different, a solution of oxalic acid being intensely sour, while that of sulphate of magnesia is extremely bitter. Attention to this point, in previously tasting a small quantity, may prevent very serious casualties. Oxalic acid not only acts with violence, but produces nearly the same effects to whatever texture of the body it is applied. The concentrated acid, if taken in considerable dose, may cause death in from two to twenty minutes. 'After death the stomach is found to contain black extravasated blood, exactly like blood acted on by oxalic acid out of the body; the inner coat of the stomach is of a cherry-red colour, with streaks of black granular warty extravasation; and in some places the surface of the coat is very brittle and the subjacent stratum gelatinized. Such are the effects of the concentrated acid. When considerably diluted, the phenomena are totally different. When dissolved in twenty parts of water, oxalic acid, like the mineral acids in the same circumstances, ceases to corrode; but, unlike them, it continues a deadly poison, for it causes death by acting indirectly on the brain, spine, and heart. The symptoms then induced vary with the dose. When the quantity is large, the most prominent symptoms are those of palsy of the heart; when less, fits of violent tetanus; and when still less, the spasms are slight or altogether wanting, and death occurs under symptoms of pure narcotism, like those caused by opium.' Very few persons have recovered when the quantity taken was considerable. (Christison *On Poisons*.)

To counteract the very rapid effects of this poison, the most prompt treatment is necessary. Chalk, magnesia, or even the plaster of the room diffused through water, should be given without delay. The other alkalis are improper, as they form soluble salts with the acid, and oxalic acid is an example of a poison which acts through all its soluble chemical combinations. Emetics may be given, if vomiting has not spontaneously taken place; but it is highly inexpedient to give much warm water, as dilution only facilitates the absorption of the poison, and induces its remote but equally fatal effects.

Notwithstanding the formidable properties of this acid, the agreeable cooling effects it displays have led to its employment in the form of lozenges, or in a dilute solution, as a refrigerant. Both in this country formerly, and still in France, it is used to quench thirst, and allay the heat of the stomach, which prevails towards the later stages of consumption. But for this purpose citric acid or lemonade is preferable, as well as safer.

Besides the immediate danger from an over-dose, there is yet a remote source of risk which requires notice. Oxalic acid exists in many vegetables, in combination with lime or potass, or free, as in the case of the cicer arietinum. Many of these plants are used in different parts of the world, as salads, on account of their refrigerating quality. Their frequent employment by persons disposed to calculous diseases is highly dangerous, as they give rise to the formation of the mulberry or oxalate of lime calculus, which is not only the most painful of all the stones found in the human kidneys or bladder, but also the most insidious, for, owing to the insolubility of this compound, no deposit or sediment is observed in the urine at an early period, so as to occasion a suspicion of what is taking place. (Majendie *On Gravel*, 2nd French edit.) [CICER.]

OXALIC ÆTHER is prepared by causing the acid to combine with the æther in its nascent state: for this purpose equal weights of oxalic acid and alcohol are distilled with twice their weight of sulphuric acid. At first alcohol and æther distil, and then oxalic æther, which collects as an oily liquid at the bottom of the receiver: this is to be repeatedly washed with water, and then boiled with litharge till its boiling-point attains 360°: by this the excess of acid is separated); and the oxalic ether, being poured off, is to be redistilled.

The properties of this ether are, that it is of an oily appearance, has an aromatic odour mixed with an alliaceous odour; its specific gravity at 45° is 1·0929, and it boils at 362°. It dissolves sparingly in water, and the solution is neutral to test paper; with alcohol it combines in all proportions: it yields oxalic acid by spontaneous decomposition, and by the alkalies is converted into oxalic acid and alcohol. It is composed of—

One equivalent of oxalic acid . .	36
One equivalent of æther . . .	37
Equivalent	73

OXALIDACEÆ are polypetalous Exogenous plants with a superior ovary, a small number of hypogynous stamens, which are usually monadelphous, and distinct styles. Their fruit contains five cells, in which there are numerous seeds, occasionally expelled with violence by a sudden contraction of the sides of the pericarp. The order is so very nearly allied to Geraniaceæ that it can hardly be considered distinct. The genus Oxalis itself is called Wood-sorrel, from the acidity of the leaves and the natural habitation of the European species in a wild state; it is however most common at the Cape of Good Hope, where the species are extremely ornamental. In the East Indies the genus Averrhoa produces a fruit (the Carambola or Blimbing), used for pickling and preserving; but its extreme acidity renders it intolerable to many persons. Our Oxalis Acetosella, or common Wood-sorrel, has been supposed to be the true Shamrock of the Irish, instead of the trefoil to which the name is more commonly applied. In the tropical parts of India is an annual Oxalis, called *O. sensitiva* in consequence of its pinnated leaves being irritable like the sensitive plant; it has been lately ascertained that the European trefoil-leaved species have the same property, only in a more feeble degree. (*Bulletin de l'Académie Royale de Bruxelles*, vol. vi., No. 12.) This phenomenon is most conspicuous in a hot sunny day.

Oxalidaceæ.

Plant of Oxalis [illegible]: 1, the stamens and styles when the calyx and corolla have been removed; 2, the ovary with the five distinct styles; 3, a transverse section of an ovary.

OXAMIDE, or OXALAMIDE, is obtained by heating oxalate of ammonia in a retort, and also by some other processes. The oxalate of ammonia is decomposed; ammoniacal, carbonic acid, carbonic oxide, and cyanogen gases being evolved: in the neck of the retort, and on the water in the receiver, a dirty white substance is deposited; this is oxamide, which is to be purified by washing with water. Oxamide is composed of—

Two equivalents of carbon . .	12
Two equivalents of oxygen . .	16
Two equivalents of hydrogen . .	2
One equivalent of azote . . .	14
Equivalent	44

It will be seen on examination that it is formed by separating the elements of one equivalent of water = 9 from one equivalent of oxalate of ammonia = 53. Although it contains neither oxalic acid nor ammonia, yet, when boiled with a solution of potash, ammonia is evolved, and oxalate of potash formed; it appears therefore that it resumes oxygen and hydrogen by decomposing water, owing to the influence of the alkali. With sulphuric acid corresponding results are obtained; carbonic acid and carbonic oxide gases are evolved, and sulphate of ammonia is formed.

The properties of oxamide are, that it is inodorous, insipid, insoluble in cold water; but boiling water dissolves it, and on cooling, flocculent crystals of a dirty white colour are deposited. When moderately heated, it sublimes unchanged; but when quickly heated, it is decomposed, yielding cyanogen gas and a bulky sooty residue. Dilute acids do not alter it, but with strong acids it suffers the change already described.

The production of this substance, and the reproduction of oxalic acid and ammonia, have given rise to some general views which have been embodied by Dumas. (*Théorie des Amides; Chimie appliquée aux Arts*, t. v., p. 64.)

OXENSTIERNA, AXEL, COUNT, born in 1583, of a noble Swedish family, studied in Germany at Rostock, Jena, and Wittenberg, in which last university he took degrees. After his return to Sweden, he followed the career of diplomacy under Charles IX., and was made a senator. When Gustavus Adolphus ascended the throne in 1611, he appointed Oxenstierna chancellor or prime minister. From that time the name of the minister is closely connected with that of his illustrious master, whose confidence he fully enjoyed, and to whom his abilities as a statesman were of the greatest service. After the death of Gustavus, at the battle of Lützen, in 1632, Oxenstierna, who was then on a mission in another part of Germany, immediately repaired to the camp, concentrated the Swedish and allied forces, urged the German princes to remain steady in the cause of the alliance against the political and religious tyranny of the emperor Ferdinand, and having received full powers from the senate of Sweden, he became the soul of the Protestant league in Germany. The difficulties which Oxenstierna had to encounter proceeded from the jealousy of his allies more than from the efforts of the enemy. He succeeded however in assembling the States of Lower Saxony at Heilbronn, and he opened the meeting by a speech. After much opposition, he obtained a supply of money for the Swedish army, and he was himself acknowledged as the head of the league. A succession of able commanders, the Duke of Weimar, Banner, Torstenson, Wrangel, all formed in the school of Gustavus, led on the Swedish and German forces with various success, while Oxenstierna directed from Stockholm the diplomatic negotiations, until the peace of Westphalia, in 1648, put an end to the Thirty Years' War. Count Oxenstierna's son was one of the Swedish envoys who signed that celebrated treaty. It was to him that the chancellor, in reply to the young man's letters, in which he had expressed himself with great diffidence in consequence of his inexperience in matters of state, wrote the following sentence, which has become proverbial: 'Nescis, mi fili, quantillâ prudentiâ homines regantur' (You do not know yet, my son, how little wisdom is exhibited in ruling mankind).

Oxenstierna was at the head of the regency of Sweden during the whole minority of Queen Christina, and he continued to be prime minister after she had assumed the reins of government. He strongly opposed Christina's intention of abdicating the crown, and being unable to prevent this act, he withdrew from public life. Christina's successor, Charles Gustavus, consulted him however on important occasions. Oxenstierna died at Stockholm, in August, 1654, regretted and honoured by all Sweden. He is said to have been partly the writer of the 'Historia Belli Sueco-Germanici,' published by Chemnitz, and also of the work 'De Arcanis Austriacæ Domus ab Hippolyto à Lapide.'

OXFORD, City. [OXFORDSHIRE.]

OXFORD, Bishopric. [OXFORDSHIRE.]

OXFORD UNIVERSITY. The origin of the University of Oxford is unknown. It is agreed upon among the ablest investigators that, although this University may be traced to very high antiquity, and beyond the age of any satisfactory records, the illustrious Saxon king, who is generally said to have founded or restored it, really did nothing of the kind. No document or well-authenticated history can be produced in which the name of Alfred appears as a benefactor to this University. It is certain however that Oxford was a place of study in the reign of Edward the Confessor, if not earlier.

The first places of education in Oxford appear to have been schools for the instruction of youth. These schools were either claustral, that is, appendages to convents and other religious houses; or secular, such as were kept by, or hired and rented of, the inhabitants of Oxford. When many of these secular scholars resided in one house, it got the name of Hall or Hostel (terms which are not yet out of use), and governors or principals were appointed to superintend the discipline and the affairs of the house. But it does not appear in what respects the education in these halls differed from that in religious houses, which were the oldest places of instruction. The schools were divided into grammar-schools, sophistry-schools, schools for arts, medicine or physic schools, law-schools, divinity-schools, &c. It is difficult to discover any traces of a regular plan of education in Oxford before the foundation of the first college by Walter de Merton. The statutes of this founder for his college are well digested: and they have been adapted with little alteration to succeeding times in other colleges as well as his.

A remarkable fact in the early history of Oxford has only been put in a clear light of late years, and that by the industry of German scholars. In the reign of King Stephen, Vacarius, a Lombard by birth, established a school of Roman law at Oxford. Stephen after a time attempted to suppress all instruction in the Roman law, but we are informed that his attempt was not successful. It is not stated how it happened that the school of Roman law was still maintained; but it was not put down at once, and it appears very probable that it subsisted for some time after the death of Vacarius. The pupils of Vacarius were numerous, and as many of them were poor, he prepared for their use (about the year 1149) a work on Roman law in nine books, which was extracted from the Pandects and the Code. The learned John of Salisbury was the friend of Vacarius, and though Roman jurisprudence was only one of his numerous studies, and not the chief of them, he was competently acquainted with Roman law, and doubtless indebted for his acquaintance with it to the Oxford school of Vacarius. (Savigny, *Geschichte des Römischen Rechts im Mittelalter*, 4er band; Wenck, *Magister Vacarius*, Lips., 1820.) [VACARIUS.]

Various accounts are given of the number of students at Oxford in the reigns of the early Norman kings. In the time of Henry III., we are told by Wood in his Annals (vol. i., p. 266) that they amounted to thirty thousand; and even when Merton College was founded, they are said to have amounted to fifteen thousand. (Gul. Rishanger, in Chron. suo MS. Bibl. Cott., Claud., D. vi., quoted by Wood, ut supra, p. 266.) But these numbers are evidently great exaggerations, and it is not easy to see how any writers could be led to make statements so grossly improbable. Still there is no doubt that the University was then frequented by a great number of students, and many foreigners resorted to it from Paris and other places.

The earliest charter of privileges to the University of Oxford as a corporate body is of the 28th Hen. III. (Pat. 28 Hen. III., m. 6, 'Libertates concessæ Cancellario Universitatis Oxon.') It was followed by charters, some of fresh privileges, and others of general confirmation of the privileges formerly granted, in the 39th Hen. III., A.D. 1255; in the 18th Edw. III., 1344; in the 17th and 33rd Edw. III.; in the 1st Hen. V.; 37th Hen. VI.; and 15th Hen. VIII. The last confirmation was in the 13th Elizabeth, in the 'Act concerning the several Incorporations of the Universities of Oxford and Cambridge, and the confirmation of the Charters, Liberties, and Privileges granted to either of them.'

The Cottonian MS. in the British Museum, Claud., D. viii., contains an ancient copy of the statutes, privileges, and customs of this University, upon vellum, written early in the fifteenth century, a beautiful manuscript. Another MS. in the same collection, Faustina, C. vii., contains an enumeration of the titles of all the charters granted to the University, whether of general or individual privilege, from the time of Henry III. to 1591, which are very numerous.

The regulation of the assise of bread and beer, and the supervision of weights and measures, were granted to the chancellor of the University by Pat. 32 Edw. III., m. 5.

The same jealousy of the authority of the University which existed in early times among the townsmen of Cambridge, prevailed at Oxford also. The quarrels between the scholars and the townsmen often broke out into open violence, sometimes accompanied with bloodshed. Matthew Paris makes mention of these riots as early as 1240. (See also Wood's *Annals of the Univ.*, vol. i., pp. 231, 237, 263, 367, 412, 456.) On several occasions the scholars quitted the University for a time. At one period they retired to Northampton, at another to Stamford. The most serious riot on record was on the day of St. Scholastica the Virgin, Feb. 10th, 1354-5, when many lives were lost. Grosteste, bishop of Lincoln, in whose diocese the University then was, placed the townsmen under an interdict, from which he released them in 1357, upon condition that the commonalty of Oxford, every year after, should celebrate an anniversary on St. Scholastica's day, in St. Mary's Church, for the souls of the clerks and others killed in the conflict; and that the mayor for the time being, the two bailiffs, and three score of the chiefest burghers, should personally appear on the said day in St. Mary's Church at mass, and offer at the great altar a penny each. The mayor and commonalty at the same time gave a bond to pay a hundred marks yearly to the University, as a compensation for the great losses occasioned by the fray; but the bond was not to be enforced so long as the mayor and sixty-two burghers came yearly and performed the penance. This bond was recited and confirmed in a charter of inspeximus by King Edward III. (Pat. 31 Edw. III., p. i., m. 26.) After the Reformation, this custom having been neglected in the beginning of Queen Elizabeth's reign for fifteen years, the University sued the city for fifteen hundred marks. The citizens answered, that their penalty was in the bond of a mass, which was against law. The lords of the queen's council however, before whom the case was finally brought, in her seventeenth year, having discharged the city from the arrears, ordered that in future the same number of citizens should, on St. Scholastica's day, attend a sermon or communion at St. Mary's, offering each a penny at the least. This was subsequently changed to attending at the ordinary church service: the offering was made immediately after the Litany, which, for that purpose, was read at the altar. It continued, with now and then an intermission (the citizens being always anxious to get rid of this penance), till 1825, in which year, on Feb. 1st, in full convocation, the University seal was affixed to an instrument which entirely released them from its observance.

This University has been long governed by statutes, or bye-laws, made at different times, and confirmed by the charters of the kings of England. Those at present in force were drawn up in 1629, and confirmed by a charter from King Charles I., in 1635. The corporation of the University is styled 'the chancellor, masters, and scholars of the University of Oxford.'

The highest officer is the chancellor. In the thirteenth century the chancellor was styled the master or rector of the schools, and appears to have derived his authority from the bishops of Lincoln, who were then the diocesans of Oxford. The bishops confirmed, while the regents and non-regents nominated, the chancellor; but after the reign of Edward III., the chancellor was elected and confirmed by the regents and non-regents only. At first the election was for one, two, or three years; but afterwards for life. Still however the person chosen was a resident member of the University, and always an ecclesiastic until the time of Sir John Mason, in 1553, who was the first lay-chancellor. It was afterwards conferred, at the pleasure of the convocation, upon ecclesiastics or laymen. Since the time of Archbishop Sheldon, in 1667, it has only been conferred upon noblemen of distinction who have been members of the University.

The chancellor's deputy was formerly styled vicegerent or commissary, but for a long time past he has been styled vice-chancellor. His office is annual, though generally held for four years. The vice-chancellor is nominated by the chancellor, on the recommendation of the heads of colleges, and appoints four deputies, or pro-vice-chancellors, who must likewise be heads of colleges. During the vacancy of chancellor however, the office is executed by the senior theologus, or cancellarius notus, resident in the University.

The seneschallus, or high steward, is appointed by the chancellor, and approved by convocation. The office is for life. The high steward assists the chancellor, vice-chancellor, and proctors in the execution of their respective [illegible] and defends the rights, customs, and liberties of the University. If required by the chancellor, he hears and determines capital causes, according to the laws of the land and the privileges of the University, whenever a scholar or privileged person is the party offending. He also holds the University court-leet at the appointment of the chancellor or vice-chancellor, either by himself or deputy.

The office of proctor is supposed to be coeval with that of chancellor. The duty of the two proctors is to inspect the conduct of the members of the University as to all matters of discipline and good order; they are in fact the acting magistrates. They must be masters of arts, of not less than four years' standing, and chosen out of the several colleges by turns according to a cycle framed in 1629 by Sir Peter Turner, Savilian professor, and Robert Heggs of Corpus College, and sanctioned by the statutes given by Charles I. at that time. After their election they nominate four masters of arts to be their deputies or pro-proctors, and may depute their authority to a larger number if necessary.

The whole business of the University is transacted in two distinct assemblies, termed 'Houses,' namely, the House of Congregation and the House of Convocation. The chancellor, or vice-chancellor, or, in his absence, one of his four deputies, and the two proctors, or, in their absence, their respective deputies, preside in both houses, where their presence is necessary on all occasions.

The business of congregation is principally confined to the passing of graces and dispensations, and to the granting of degrees. Upon all questions submitted to that house, the vice-chancellor singly, and the two proctors jointly, have an absolute negative. In the sole instance of supplicating for graces, but in no other, every member of the house, in addition to his general right of suffrage, has a suspending negative upon each grace for three times, as the grace is proposed in three distinct congregations; but previously to the fourth supplication, he is required to state privately to the vice-chancellor and proctors the ground and proof of his objection, which are submitted to the judgment of the House for approbation or rejection. All suffrages for or against graces and dispensations in congregation are to be whispered secretly into the ear of the proctor, by a majority of which, given in the words *placet* or *non placet*, the fate of the measure is ultimately determined.

The power of convocation extends to all subjects which are connected with the affairs of the University. In the exercise however of one particular branch of its privileges, the enacting of new or the explaining of old statutes, some restriction is imposed. If the statute to be explained be a royal, or, as it is commonly called, a Caroline statute,* the royal permission is first to be obtained. If it be deemed advisable to enact *de novo*, or to explain any except a royal statute, the measure must be referred to the hebdomadal meeting of the heads of houses; and if this meeting, on deliberation, approve of the measure, it draws up the terms in which it is to be promulgated in the House of Congregation, and, three days after, proposed in convocation.

As in congregation, so also in convocation, the chancellor or vice-chancellor singly, and the two proctors jointly, are severally invested with an absolute negative upon all proceedings except in elections.

In both Houses, when the negative of the vice-chancellor, or of the proctors, is not interposed (an interposition almost as rare as the royal veto in parliament), every question is decided by the majority.

For the better government of the University, there is also an hebdomadal meeting of the heads of houses, who meet every Monday, and at other times when convened by the vice-chancellor. This meeting consists of the vice-chancellor, heads of houses, and proctors, who deliberate upon all matters relating to the privileges and liberties of the University, and inquire into and consult respecting the due observance of statutes and customs. All the letters likewise of the chancellor, in the case of dispensations, which are addressed to convocation, must be sanctioned by them before they are recited in the House.

In 1603 King James I., by diploma dated March 12th, granted to the Universities of Oxford and Cambridge the privilege of choosing two representatives in parliament. This measure was opposed by the House of Commons, but ably supported by Sir Edward Coke. The members are chosen by the vice-chancellor, doctors, and regent and non-regent masters in convocation.

The following are the colleges of Oxford, with the dates of their respective foundations:—University College, said to have been founded in 872; restored before 1249. Merton, founded at Malden, in Surrey, in 1264; removed to Oxford, 1274; Exeter, 1314; Oriel, 1326; Queen's College, 1340; New College, 1386; Lincoln, 1427; All Souls, 1437; Magdalen, 1456; Brasenose, 1490; Corpus Christi College, 1516; Christ-Church, 1525; Trinity, 1554; St. John's College, 1555; Jesus College, 1571; Wadham, 1613; Pembroke College, 1624; Worcester, 1714; St. Edmund Hall, soon after 1269; St. Mary Hall, 1333; New Inn Hall, 1392; Magdalen Hall, 1487; St. Alban's Hall, soon after 1547. It may not be unnecessary to remark that the colleges are corporate bodies belonging to the class called *eleemosynary* [COLLEGES], and are quite distinct from the corporation of the University, with which, in the common opinion, they are often confounded; a mistake which the dicta of eminent judges (Lord Mansfield for instance), and still more the actual mode of administering the affairs of the University at present, has chiefly contributed to create and maintain. [UNIVERSITY COLLEGE, &c.]

The buildings belonging to the University of Oxford are:—

1. The *Schools*, with the *Bodleian Library*. The Divinity School, with the room above forming part of the Bodleian, was completed about the year 1480: the rest of the Schools, with the remainder of the Bodleian, early in the seventeenth century, by Thomas Holt, of York, who is supposed to have been the architect of Wadham College, and of the new quadrangle of Merton, both built about the same time. The Bodleian Library was first laid open to the public on Nov. 8th, 1602. Attached to it is the picture-gallery of the University.

2. The *Theatre*, built by Gilbert Sheldon, archbishop of Canterbury and chancellor of the University, in 1669, at the expense of fifteen thousand pounds. The upper part of this building was used for the University press till 1713.

3. The *Ashmolean Museum*, built at the charge of the University in 1683.

4. The *Clarendon*, completed in 1712, partly from the profits arising from the sale of Lord Chancellor Clarendon's 'History of the Rebellion,' the copyright of which was given to the University. The printing for the University was carried on in this building from 1713 to 1830, when it was removed to the newly-erected printing-house. The basement-story of the Clarendon contains at present a police-room, and other apartments connected with that establishment; the remainder of the building is appropriated to offices for the despatch of University business, and lecture-rooms for the professor of experimental philosophy and the readers in mineralogy and geology.

5. *Radcliffe's Library*.—The munificent founder of this library was John Radcliffe, M.D., who was born at Wakefield in 1650. By his will, 13th September, 1714, he appropriated 40,000*l*. for the building and purchase of the ground on which it stands; 100*l*. per annum for the purchase of books, and 150*l*. per annum for the librarian. James Gibbs, a native of Aberdeen, was the architect. The foundation-stone was laid June 16, 1737, and the building was completed in 1747. This library was opened April 13, 1749, in a public ceremony by the trustees of Dr. Radcliffe's will. It has been appropriated by a late resolution of the trustees to the reception of books in medicine and natural history. In the area of this library a few antique marbles are deposited, with a selection of casts from the best statues of antiquity. Here also is preserved the Corsi collection of specimens of the marbles employed in the ornamental architecture of both antient and modern Rome.

6. *The Radcliffe Observatory*.—This building was erected out of the funds of Dr. Radcliffe by the trustees of his will. It comprises a dwelling-house for the observer, apartments for observation and lectures, as well as rooms for an assistant-observer, and it is amply supplied with astronomical instruments. The foundation-stone was laid June 27, 1772. The original architect was Mr. H. Keene. The building was altered and completed by Mr. James Wyatt. The Radcliffe trustees appoint the observer, who nominates his assistant.

7. *The University Press*.—As the great increase of busi-

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* These statutes transmitted by Charles I., and confirmed by convocation, [illegible]

ness rendered it necessary to have more extensive premises, the delegates of the press were empowered by convocation, in 1825, to contract for the purchase of ground north of Worcester College, for the erection of a new building. The present building was commenced in 1826, from a design made by Mr. Daniel Robertson. The entire front and the south wing were finished in 1827; the north, which was commenced in 1829 under the superintendence of Mr. Blore, was completed in the following year; and on the west side of the quadrangle are houses for the superintendents, an engine-house, strong-room for standing type, &c.

Beside these buildings, there is a *Botanic Garden*, containing about five acres, originally the burial ground of the Jews in Oxford. The entrance gateway, designed by Inigo Jones and executed by Nicholas Stone, is decorated with a bust of the founder, Henry Danvers, earl of Danby, by whom these premises were purchased and improved at an expence of 5000*l*. in 1632.

The Professors of the University are, like those of Cambridge, paid from various sources; some from the University chest, others by the king, or from estates left for that purpose. They are—the regius professors of divinity, civil law, medicine, Hebrew, and Greek, upon the foundation of King Henry VIII.; the Lady Margaret's professor of divinity; the Savilian professors of geometry and astronomy; Dr. White's professor of moral philosophy; the Camden professor of antient history; Tomline's prælector in anatomy; a professor of music; two professors of Arabic, one of whom is called the Lord Almoner's Reader; a botanical professor; a professor of poetry; a regius professor of modern history and modern languages, founded by King George II. in 1724; an Anglo-Saxon professor; the Vinerian professor of common law; a clinical professor; the Aldrichian professors of anatomy, of the practice of medicine, and of chemistry; a professor of political economy; a professor of Sanscrit; Lee's lecturer in anatomy; and readers established by grant from the crown, in experimental philosophy, in mineralogy, and in geology. Several of these professors give no lectures; a circumstance which is explained by the fact of some of the antient studies of the University having fallen into disuse, civil law for instance; but more particularly in consequence of the practical change which in the course of time has taken place in the system of teaching. The instruction is now given to the undergraduates by their tutors in the respective colleges, and the University merely determines the course of instruction and superintends and directs the examinations which it requires the students to submit to as a preliminary to the attainment of a degree.

The total number of members upon the books of the different colleges and halls of Oxford, at the end of 1839, was 5440.

(Wood's *Annals of the University*, edited by Gutch; Chalmers's *History of the Colleges, Halls, &c. of Oxford*, 2 vols. 8vo., 1810; Oxford *Univ. Calendar*, to which last work the reader is referred for more particular information on the existing state of the University, its scholarships, examinations, prizes, &c.)

OXFORD, EARL OF. [HARLEY.]

OXFORDSHIRE, a midland county of England, bounded on the north-east by Northamptonshire, on the east by Buckinghamshire; on the south-east, south, and south-west by Berkshire; on the west by Gloucestershire, and on the north-west by Warwickshire. Its figure is very irregular: the greatest length is from north by west to south by east, from the three shire-stones at the junction of the three counties of Northampton, Warwick, and Oxford, to the junction of the Kennet with the Thames, near Reading in Berkshire, 51 miles: its breadth is very variable: in the northern part, from the neighbourhood of Burford to the banks of the Ouse near Buckingham, it is 32 miles; but to the north of Oxford city the breadth contracts suddenly to about 7 miles; and in the southern part of the county it never exceeds 16 miles, and has that breadth only for a short space, between Abingdon and Thame. The area is estimated at 756 square miles: it is in size the thirty-first of the English counties, being rather smaller than Surrey, but larger than Berkshire. The population, in 1821, was 136,971; in 1831 it was 152,156; showing an increase in ten years of 15,185, or more than 11 per cent., and giving 201 inhabitants to a square mile: in amount of population it is the thirtieth of English counties; in density of population, the twentieth. Oxford, the shire town, is at the junction of the Charwell with the Isis or Thames, 51 miles from London (St. Paul's) in a straight line west-north-west; 57 miles from the General Post-office, which is close to St. Paul's, by the Ludlow and Worcester mail-road through Uxbridge, Beaconsfield, and High Wycombe; or 60 miles by the Caermarthen and Gloucester mail-road, through Hounslow, Colnbrook, Maidenhead, and Henley.

Surface and Geological Character.—The southern part of the county is occupied by the Chiltern Hills, which extend across the southern extremity from Buckinghamshire on the east to Berkshire on the south-west. These hills are composed of chalk, and form part of that extensive range of chalky elevations which extends through the counties intervening between Norfolk and Wiltshire, and which encloses on that side the chalk basin of London. The outer or north-western escarpment of those hills, which is the steep side, crosses the county from north-east to south-west, near Stokenchurch, Nuffield, and Checkindon or Chalkenden. This escarpment is known on the eastern side of the county as Stokenchurch Hill. On the western side, on the summit, is Nuffield Common, which has an elevation of 757 feet. Nettlebed Hill, near Nuffield Common, is 820 feet high. The Thames flows through a winding valley or depression traversing this chalk range. The Chilterns were formerly occupied by a forest or thicket of beech trees, which are the trees best adapted to the soil. There are still several beech woods or plantations, though a large part of the surface is now occupied as arable land or as sheep-walks.

From the foot of these hills the lower formations of the cretaceous group crop out. The upper green-sand scarcely appears, being almost lost in the chalk marl which overlies and in the gault which underlies it: the gault has been sometimes designated Tetsworth blue marl or Tetsworth clay, from the village of Tetsworth near Thame, or (from its suitableness to the growth of the oak) 'oak-tree soil.' The iron-sand or lower green-sand crops out from beneath the gault, and with its subordinate beds of ochre is found covering to the depth of 50 feet the upper oolitic formations on the summit of Shotover Hill, which hill has an elevation of 599 feet.

The upper division of the oolitic series, comprehending the Purbeck, Portland, and Kimmeridge beds, crops out from beneath the iron-sand. These oolites rise to their highest point in this county in Shotover Hill, on the summit of which they are covered by the iron-sand and ochre. These beds are quarried at Garsington, not far from Oxford, on the south-west of Shotover Hill.

The surface occupied by these formations from the chalk marl inclusive forms an undulating tract without any lofty hills: each group of formations occupies a strip of surface of varying breadth, extending from north-east to south-west across that narrow part of the county which lies south of Oxford. The Kimmeridge clay does not appear on the east of Shotover Hill.

In the immediate neighbourhood of Oxford, to the east of that city, the coral rag, one of the formations of the middle division of oolites, forms an elevated platform between the valleys of the Charwell and the Thame. Beckley, on the northern edge of this platform, is its most elevated point: on the southern side it gradually subsides, the strata dipping in that direction. This formation is not found on the eastern side of the county, but on the western side it extends across the Thames into Berkshire: the Thames flows through what appears to be a breach formed by subsequent denudation in this range. The blue clay or Oxford clay, which forms the lowest member of the middle oolite group, separating the coral rag from the lower oolites, crops out from beneath the coral rag, and occupies the middle part of the county as far as Bicester, Woodstock, Witney, and Bampton, near which towns the line of junction between this and the subjacent formations may be traced. The tract occupied by the Oxford clay is for the most part low and flat. It forms the valley of the Isis or Thames above Oxford. On the eastern side of the county the Portland beds of the upper series of oolites rest immediately on the Oxford clay, the intermediate formations not being found.

The rest of the county, except the valley of the Charwell, from the neighbourhood of Banbury upward, is occupied by the lower division of the oolites. The upper beds of this division, which are probably cornbrash beds, are often of a pasty or chalky consistency and colour. The forest marble, another formation of this division, has obtained its name from Wichwood forest near Burford, where it is found. It is a limestone, susceptible of a tolerable polish, and occausually used as a coarse marble. It consists of thin slaty beds, seldom having a thickness of two or three feet, and parted by layers of clay varying in thickness from less than an inch to a foot. The calcareous slate of Stonesfield near Woodstock probably belongs to the same part of the series as the forest marble: it is remarkable for the singular variety of its organic remains, among which are the spoils of birds, land animals, amphibia, sea shells, and vegetables. The slate consists of two fissile beds of buff or grey oolitic limestone called 'pendle:' each bed is about two feet thick, and is separated by a bed of loose calcareo-siliceous sandstone called 'race.' The pendle, after being quarried, is exposed to the action of a winter's frosts; and the blocks, being struck on their edge with a mallet, freely separate into slates sufficiently thin to afford a light material for roofing. The quarries are in the valley of the Evenlode, near the village of Stonesfield, not far from Blenheim: they have been wrought from a remote period, and give employment at present to many labourers. The great oolite is quarried near Burford; and these quarries supplied the stone of which St. Paul's Cathedral (London) is built.

The lower division of the oolites form the mass of a well-defined range of hills rising from the valley occupied by the Oxford clay. The cornbrash is generally found on the first acclivity, rising above the valley; the forest marble and calcareous slate crop out from beneath the cornbrash, and form the slope above it; and the great oolite, emerging from beneath these, forms the highest part of the hills. In extensive districts however, both in Oxfordshire and in the adjacent county of Northampton, some causes have led to the denudation of the cap of the great oolite in several places, causing it to terminate on the north-west in a low terrace, and exposing the subjacent beds of ferruginous sands and sandstone. Numerous insulated masses of the great oolite are scattered throughout the space thus denuded, sometimes forming the caps of hills, and in the regular plane of the strata, at other times forming extensive masses in the valleys or low grounds, surrounded by sandy hills and disposed in considerably inclined planes, thus appearing as if they had been precipitated, perhaps by waters undermining the subjacent sandy beds, into their present situation. The denuded parts occupied by the ferruginous sands extend over the greater part of the county north of Deddington and Chipping-Norton, and occupy the greater part of the valley of the Evenlode. Between the great oolite and these sandy and sandstone beds a thick clay is generally found; and beneath the sands is found a sandy, gritty, micaceous marl, generally deriving a green colour from a copious admixture of silicate of iron, and containing beds of gritstone, some of which are decomposed by exposure to the atmosphere, while others are much harder, and are quarried for flagstones, troughs, and other coarse purposes. The district occupied by these oolitic and arenaceous formations contains some of the highest hills in the county. Epwell Hill, near the border of this county and Warwickshire, is 836 feet high. Edge Hill is close to the border, but just within Warwickshire.

The lias beds, which underlie the oolites, rise to the surface in the valley of the Charwell on the north-eastern border of the county, and again in a projecting portion on the north-western border near Chipping-Norton; but the extent of country occupied by them is very trifling.

Hydrography and Communications.—Oxfordshire is almost entirely comprehended in the basin of the Thames. The Stour, an affluent of the Warwickshire Avon, rises just within the north-western boundary; and the Ouse, in the upper part of its course, skirts the north-eastern boundary, and receives one of its smaller tributaries from that part of the county; but the districts watered by these streams are too small to require further notice.

The Thames, or, as it is sometimes called in the upper part of its course, the Isis, first touches the county a little below Lechlade in Gloucestershire, at which town the navigation commences. From below Lechlade it flows along the border between Berkshire and Oxfordshire, until it finally quits the latter county a little below Henley. The length of this part of its course may be estimated at about 71 miles. Its course from Lechlade is easterly to below the junction of the Windrush; then north-north-east to below the junction of the Evenlode; from thence south-south-east, though with many windings, past Oxford, where it receives the Charwell, Abingdon in Berkshire, where it receives the Ock, Dorchester, where it receives the Thame, and Wallingford in Berkshire, to the junction of the Kennet near Reading in Berkshire: below the junction of the Kennet its course is first north-east then north-west to Henley, just below which it leaves Oxfordshire altogether.

The Windrush, Evenlode, Charwell, and Thame belong chiefly to Oxfordshire. The Windrush rises in the Cotswold Hills, on the border of Worcestershire and Gloucestershire, and after flowing about 15 or 16 miles through the latter county, enters Oxfordshire, through which it has a further course of about the same length (making 32 to 36 miles in all), passing Burford and Witney into the Thames, into which it flows by several channels. It is not navigable, but turns many mills.

The Evenlode rises near Moreton-in-the-Marsh in Gloucestershire, and enters Oxfordshire about 9 miles from its source, having previously skirted the border for a short distance: its course through Oxfordshire may be computed at 22 miles, making about 31 altogether. It passes Charlbury. It receives several small tributaries; one (7 miles long) from Great Rollwright near Chipping-Norton, just as it enters the county, and one (the Glyme, 12 miles long) also from the neighbourhood of Chipping-Norton. The Glyme passes Woodstock and flows through Blenheim Park, where it expands into a large sheet of water. Neither the Evenlode nor any of its tributaries is navigable, but they turn many mills.

The Charwell rises near the village of Charwelton in Northamptonshire, and flows southward into the Thames. About 2 miles from its source it enters Oxfordshire near the northern extremity of that county, and has a farther course of about 37 miles (making 39 altogether) past Banbury to Oxford, where it joins the Thames; part of this course is on the border of Oxfordshire and Northamptonshire. It receives a number of small tributaries, the principal of which are the Sorbrook from the border of Warwickshire, and the Ray from the neighbourhood of Bicester. The Charwell is not navigable: there are many mills both on the river and its tributaries.

The Thame rises at Stewkley, between Aylesbury and Fenny-Stratford in Buckinghamshire, and flows south-west 17 *or* 18 miles to the town of Thame, where it touches the border of Oxfordshire: for about 5 miles farther it skirts the border, and then entering the county flows through it about 10 miles (making 32 *or* 33 miles altogether) into the Thames at Dorchester. It is navigable from Thame to Dorchester, 13 miles.

The Oxford Canal, the only one in the county, commences at Longford in Warwickshire, between Coventry and Nuneaton, where it unites with the Coventry Canal, 313½ feet above the level of the sea. It enters Oxfordshire near the northern extremity of the county, some miles north of Banbury, and follows the valley of the Charwell southward to Oxford, where it terminates in the Thames, 192 feet above the level of the sea. The first act for making this canal was passed A.D. 1769; the last act relating to it was passed in 1829. This canal forms part of one main line of inland navigation between London and the manufacturing towns of the midland iron district, Birmingham, Wolverhampton, &c.; also between London and Manchester and Liverpool. An immense quantity of coal is conveyed by it from the Warwickshire and South Staffordshire coal-fields to Oxford and other towns on the Thames.

The principal roads are from London to Oxford, and from thence to Gloucester, Worcester, and Birmingham. The road travelled by the Caermarthen and Gloucester mail enters the county at Henley-upon-Thames, and runs by Nettlebed, Bensington, and Dorchester to Oxford, and from thence by Witney and Burford into Gloucestershire. That traversed by the Ludlow and Worcester mail enters the county near Stokenchurch, and runs by Tetsworth and Shotover to Oxford, and from thence by Woodstock and Chipping-Norton to Moreton-in-the-Marsh, Gloucestershire. The road travelled by the Stroud mail branches off from the Caermarthen and Gloucester mail-road at Dorchester, and runs to Abingdon, just before entering which it crosses the Thames and quits the county. The road travelled by the Birmingham mail, before the formation of the rail-road, enters the county between Aylesbury and Bicester, and runs by Bicester and Banbury into Warwickshire. There are no rail-roads in Oxfordshire. The London and Birmingham line passes several miles to the north of it through Northamptonshire and Warwickshire.

Agriculture.—The climate of this county is, on the whole, colder than its situation in the central part of the island would lead one to expect. The hilly lands in the north-western part are exposed and bleak; and the influence of the winds is only partially checked by the low stone-walls which form the usual boundaries of the fields. The poorer chalky soils also on the slopes of the Chiltern Hills are late in bringing crops to maturity. But notwithstanding this circumstance, the county may be reckoned amongst the most productive agricultural counties of England; and some of the land is of a quality which can scarcely be surpassed anywhere.

The soil may be divided into four distinct classes:—the rich red loam, the *stonebrash*, the chalky, and the irregular loams; and sands and gravels, which cannot be classed with any of the foregoing. Arthur Young, in his Report of Oxfordshire, states the proportions of these soils as follows:—

Red land	79,635	acres.
Stonebrash	164,023	„
Chiltern chalk	64,778	„
Miscellaneous	166,400	„
Total	474,836	acres.

The red land is partly in old grass, in which state it is very valuable, and partly cultivated as arable land. A great portion of this division was formerly disposed in common fields and consequently poorly cultivated. The enclosure and division of these lands have, in many cases, doubled their annual produce. A finer tract of land than this red loam is scarcely to be found. It is neither heavy nor light, wet nor dry, but easily worked at all times; and the crops, with a very slight attention to the cultivation, amply repay the farmer for his trouble and outlay. The land lets at a high rent, but the tenant can well afford it, his crops being certain, and almost always very abundant.

The stonebrash district, which extends from the borders of Gloucestershire across the country to the north of Oxford and Whitney, is of inferior fertility to the red land; but it is easily worked, and, having a porous subsoil, is not often injured by rain. The soil is formed of decomposed stone, chiefly chalk and sandstone. The subsoil is generally porous. Very fine marl is frequently found at a small depth under the surface; and where the soil is of a light quality with little cohesion, the application of marl is highly advantageous.

The chalk district is in the south-eastern portion of the county. The chalk is generally covered to a certain depth with a light calcareous loam, evidently produced by the decomposition of the chalk and the mixture of organic matter in a state of decay. Flints of various shapes are mixed up with the loam, and in some places are supposed to be essential to the fertility. The low lands in the valleys through which the rivers flow are in many places covered with the finest herbage, and maintain much cattle. A part also is cultivated as arable land, and in the hands of regular gardeners would make excellent market-gardens; as it is, it produces great crops of barley, clover, beans, and wheat, and, when properly managed, heavy crops of turnips.

Besides these distinct soils, there are many of a mixed nature varying in texture and quality without any regularity. Where they are incumbent on a porous subsoil, they are mostly fertile. Some few consist of poor sands or wet clays, which form the extremes, and are very unproductive until they are corrected and improved by marling or draining.

The land in this county, as in many others, was formerly ploughed in high broad ridges, wherever the moisture could not readily sink through the subsoil. These ridges, so often described, were made by repeatedly ploughing towards the same line in the middle of the ridge. All the good soil was thus accumulated in the crown, and the deep furrows between the ridges were completely stripped to the subsoil. The consequence was, that much good soil was buried, and half the surface produced little or nothing. It was not an easy task to correct this and to lay the lands into neat and moderate stitches, so that the crown and furrow might alternately occupy the same line. It took some time to undo what many years had been employed in effecting, and some caution was required not to proceed too rashly in this reform. If the good soil of the crown were buried at once in the deep furrows in order to level the surface, the crops would be very deficient. The only rational plan is to proceed slowly, forming a narrow stitch in the old furrows and gradually widening it and raising it, till the old high stitch is divided into two moderate ones. Where the subsoil is porous or the land has been efficiently underdrained, it may be ploughed flat without risk or danger, and the crop will be better and more equal.

The implements of husbandry now in common use in Oxfordshire are greatly improved. The old plough with a straight wooden turn-furrow and a pair of wheels in front, which, with four horses, scarcely ploughed three-quarters of an acre in a summer's day, is now seldom met with. But more horses are still used than strict economy would warrant, and the time occupied in labour is seldom more than seven or at most eight hours in the day, except in harvest. The walk of the horses and men is sluggish.

Threshing-machines have been erected on many of the larger farms, but, from the great outcry against them, they are not in general use at this time on moderate-sized farms. The farmers prefer allowing their men to thresh by the task, as it keeps up a habit of industry and prevents their becoming idle when other work is slack. But if the time lost in threshing by the flail were applied to draining, marling, or burning the soil, the increased crops would soon show whether machinery employed in husbandry to lessen manual labour be profitable or not.

Improved implements, such as scarifiers, grubbers, and drilling-machines, of various constructions, are used in most districts, having been introduced by some spirited proprietor or extensive farmer. If they are not always found so useful as the inventors of them would wish the farmers to believe, they excite reflections and comparisons which tend greatly to the improvement of the old mode of cultivation and to the economy of labour.

There are some large estates in the county, the property of noblemen and men of fortune, and a considerable portion of the county belongs to ecclesiastical and other corporations. These last, being let for terms of years or lives renewable at different periods, are not in general so well cultivated or so highly improved as where the leases are more certain. Short leases with restrictive clauses are common in some parts of the county, but these are very little more advantageous to either landlord or tenant than when the farm is held at will. It is impossible to prescribe a certain course of crops without destroying every chance of improvement in the system adopted.

The course of crops on the light loams is based on the Norfolk rotation, but generally with the addition of an extra crop or two after the wheat, such as beans and oats. Although this gives more crops of corn in the six years, it is very doubtful whether on any but the richest land it is equally profitable, except where there are meadows attached to the farm on which the proper quantity of stock can be kept to produce sufficient manure. Where mangel-wurzel, tares, or other crops for cattle or sheep, are taken instead of turnips in the recurrence of the fallow crop, the four years' course will in general keep the light lands cleaner and in better heart at the least expense. In the heavier soils which have been drained, or have a porous subsoil, the convertible system, having half the land in artificial grass and half cropped, is preferable; in that case the course is—turnips or other roots,—barley or oats,—clover and grass seeds, to remain three years or more,—wheat,—beans; the beans first, if the soil is heavy, and drilled so as to admit the hoe freely. The manure is given to the turnips abundantly. A small dressing on the grass, when it is ploughed up for beans, may be advantageous to the succeeding wheat crop; but if the grass has been fed off more than once with sheep, this will not be required.

The turnips were, till within late years, almost invariably sown broadcast. The hoers were expert, and the ground appeared well covered, if the turnips escaped the fly. Many farmers could not be persuaded to try wide rows and ploughing between them; but the example of some gentlemen and opulent farmers has much shaken the faith in broadcast turnips; and wherever the row culture has been once fairly adopted, especially in the heavier loams, it has in no case been abandoned. It is not the superior weight of the turnip crop alone which renders this method preferable, but the more perfect stirring of the soil and deepening of its staple when laid in narrow and high ridges. When the turnips are given to sheep on the ground, they are cut into slices or strips by a machine, and given in troughs, which is a great improvement on the old method of folding: and if they are carted off to the cattle yard, the ridges give great facility to the carts, the wheels of which run in the furrows, as well as the horse which draws them. The introduction of the cultivation of mangel-wurzel, which is always in rows, has much diminished the prejudice against turnips in this way.

The corn crops are very generally drilled, and the hand-hoeing of wheat, just as it begins to tiller in spring, is gaining ground, and cannot fail to increase the average produce of this important grain.

On most of the stiff soils wheat is still most commonly sown on a complete fallow, and no doubt the finest crops are thus obtained. The only question is the expense. The soil is cleaner, requires less manure, and is in better condition after the wheat, than if a crop of beans or tares had preceded. But a whole year is lost every fourth year, and less food is produced for cattle; consequently less manure made. If all this be taken into consideration, the advantage of greater intervals between the fallows will soon be apparent; the best farmers find it so. Where the land has been fallowed for wheat, very good crops of barley are produced after the wheat, and this practice, however much condemned by the modern rules of agriculture, has notwithstanding many abettors. Good wheat land will produce heavier barley than light turnip land; and hence it is asserted by some that barley is better after wheat than after turnips, but no one who has had any experience of this crop will assert this to be the case on the lighter and poorer soils. The finest barley grows on good rich land after a fallow without manuring, but this is too expensive a plan, as the same land would produce a much more valuable crop of wheat.

Beans are usually dibbled across the stitches. Women put them in by a line with a short dibble. They are generally put in too close: the rows are seldom above a foot apart, and the beans about three or four inches distant in the rows. This is proved by their often dibbling nearly a sack to an acre. The land is ploughed before Christmas, and the beans are dibbled as early as the weather permits; sometimes in January, and generally before March. They are hoed by hand as soon as they have four leaves. By having the rows across the line of ploughing, the ground is more easily cut with the hoe and laid level. A second hoeing is given when the beans are a foot high, and the weeds which rise in the rows are pulled out carefully by hand. To have the work well done costs from ten to twelve shillings per acre for the two hoeings; it is often done for less, but there is little saving in having it done imperfectly. It often depends on the care taken in hoeing the beans whether a crop of wheat may be obtained after them on a single ploughing or not.

Clover and rye-grass are usually sown among the barley, either separately or mixed. The rye-grass alone is admirable food in spring for ewes and lambs. The clover is usually mown for hay, and when the two are mixed, the hay is not only more readily made, but the crop is heavier; the rye-grass shoots above the clover plant and interferes very little with its growth. Rye-grass however must not be allowed to form its seeds, for in that case it impoverishes the soil, and the wheat crop suffers in consequence.

The cultivation of sainfoin on the chalky loams is one of the great resources of the farmers on such soils. Wherever there is chalk, sainfoin will thrive, and continue to yield both hay and pasture for many years. When it wears out at last, and is ploughed up, the soil is found greatly improved for corn. By means of sainfoin many a poor chalky farm has become profitable, and yielded a double and triple rent of what it did before. Its value is fully appreciated in Oxfordshire.

The meadows in this county which lie along the banks of the rivers are productive of excellent herbage; and the hay of some of the upland meadows cannot be surpassed. This may be supposed from the fertile nature of the soil in many places. There are scarcely any irrigated water-meadows. The old pastures, which have been in that state from time immemorial, and which many would think it a sacrilege to break up, produce rich butter and good cheese with proper management. But many of the pastures are neglected: rank weeds are allowed to grow in them, and ant-hills occupy a considerable portion of the surface. A little attention would make them much more productive. In some situations, where the soil is light and friable, and where the herbage is not of the finest quality, the plough, in spite of prejudice, would greatly improve them even if laid down again in a few years. The dread of not obtaining a good sward again is removed by the improved method of laying down arable land to grass; and the experience of the value of newly-sown pastures, when fed off at first, soon reconciles the farmer to the ploughing of old grass. Many a rich meadow has no doubt been ruined by ploughing it up and taking successive crops of corn, but this is the abuse of the system. Rich grass may be let alone, but that which is inferior may be improved by a course of arable cultivation. Within a reasonable distance of Oxford, and between that city and London, the fatting of calves, by allowing them to suck the cows, is preferred to making butter. The trouble and expense are much less. There is no milking nor churning: a man and a boy can manage twenty cows easily. In summer there are more calves suckled than there are cows; and as the milk falls off the proportion is lessened, till it requires two or three cows to fatten a calf. They are of ready sale when fat; and young sucklers, three or four days old, are readily purchased from the dairies. A calf eight or nine weeks old, which costs about twenty shillings at first, will sell for 4*l.* 10*s.* to 5*l.*, giving 3*l.* 10*s.* to 4*l.* for the milk it has sucked. This is a considerable produce from one cow in full milk. Butter would not produce so much; but the value of the porkers fatted on the skimmed milk, when added to the produce of the butter, will give more than this. A careful dairyman who attends to his business makes the most that can well be got from the cows. Suckling requires less attention, and is therefore preferred by many.

The farm-horses in Oxfordshire are usually good and active; and if too many are often put together to a plough or waggon, they are the fatter and sleeker for it. If the farmer likes to spend part of his profits in having a team of fine fat horses, it is his concern; but if he prefer other comforts to the sight of a fine team, he may save a considerable portion of his expenditure, by making his horses do more work, and put out their whole strength. They must have plenty of corn inside, but not much fat on the ribs, to do a full day's work. The Oxfordshire waggons have nothing remarkable in them; they are light, and similar to the Berkshire. Single-horse carts, which are in general so much more handy and useful, are only used by a few of those proprietors and farmers who have laid aside old prejudices, and can appreciate improvements, from whatever quarter they may come. Light single-horse waggons, which have many advantages in some countries, are unknown in most parts of England: on a hard road they are even preferable to carts, both as to convenience and the load they will carry. The mode of feeding the horses in summer by soiling, chiefly with tares and cut clover, is very general, and to be commended. If the cows were kept in the stable during the heat of the day in summer, and in the cold nights of winter, more milk and butter would be produced, and the manure would well repay the trouble of giving them cut food. Some intelligent farmers have adopted this plan, and a very few feed the cows in stalls or sheds all the season.

The cows usually met with in this county are of various breeds, according to the fancy of the proprietors, some preferring the finely proportioned Devonshire cows, some the poor ill-shaped Alderneys, with their rich yellow cream. Some have cows of the old long-horned breed, but these are not now very common. The improved short-horns are now the favourite breed, both for the dairy and for calves: they fatten off readily, and always obtain fair prices. The small Ayrshire, than which a neater or more useful cow is scarcely to be found, is not very common, at least of the true breed; but those who have tried them, and reared them on the lands where they were afterwards to be fed, have had reason to be satisfied. They unite the qualities of the Alderneys and short-horns, and may probably be crossed with either, as rich milk or a good carcass is considered to be most desirable. It is a general observation in all dairies, that the cows bred at home are superior to those of the same breed brought from a distance. Most dairymen buy cows with their young calves, or ready to calve, and it is only the produce of some favourite cow which is reared now and then. These heifers having been well fed, winter and summer, from their birth, make fine cows, even if the breed be not the best. In the rich vale of the Thame the cows are chiefly of the short-horn breed, and purchased in calf at three years old. In these rich pastures they will thrive, wherever they may have been bred; but if they come from a rich country, and are transplanted on a poorer, they will not thrive so well. The short-horn breed is too large for a poor soil; the Ayrshire or North Devons are better in such situations. The latter are very good when they happen to milk well, but they often get fat at the expense of their milk. The Glamorgan cows are still in repute with some, but they are generally superseded by the short-horn and the Devon. For fatting calves, quantity of milk is of more importance than richness. In this respect the Teeswater breed is pre-eminent.

Arthur Young, in his 'View of the Agriculture of Oxfordshire,' reckons the average of butter made every week on rich pastures throughout the year at from 5lbs. to 6lbs. per cow. This will give from 260lbs. to 312lbs. per cow in the year, which is far above the highest average stated in any other county. We had occasion before to estimate the produce of a cow on very rich pasture in an adjoining county to be about 200lbs. in the year, and we are inclined to adhere to that opinion. [BUCKINGHAMSHIRE.] If we suppose his calculation to be for nine or ten months only, the two results will approach more nearly.

There are some teams of oxen for the plough, but they become fewer every year. In spite of all that has been said and written on the subject, and the many calculations of the expense of cultivation with oxen compared with horses, which are in favour of the former, every spirited farmer takes the first opportunity of getting rid of his ox-team, and using horses instead. The sluggish pace of the ox is not suited to the taste of a man who strives to introduce economy of time and active progress in his work. It is enough for him to see two active horses walking briskly with one plough, while four heavy oxen creep on with another, to become impatient of the slowness of the oxen. The oxen are fatted off without working; and if this does not give so fine-grained beef, it puts more money into the farmer's pocket, which is an irresistible argument.

Sheep are an important object with the Oxfordshire farmer, and are in general well managed. The breeds are chiefly the Leicester and South-down, and crosses between these and the Cotswold, which produces a good sheep for some situations. The pure breeds seem however to be preferred. Where fine mutton and good wool are an object, the South-downs stand foremost; where quantity of meat and wool are to be obtained in a short time, and at the least expense, the Leicesters have the preference. On short grass the South-downs thrive best; in rich meadows the Leicesters. The increased cultivation of turnips increases the number of sheep kept and fatted. On a moderately light soil with a porous subsoil, the farmer will thrive best who can maintain and feed the largest flock of sheep on his arable land. The turnips and sheep are the basis of all improved cultivation of such lands. The raising large crops of turnips on ridges, and cutting them all for the sheep and lambs, will enable a tenant to live and realise a fair profit where, without these two improvements, he would scarcely be able to pay a moderate rent.

Large hogs are prized in Oxfordshire, where enormous boars are reared and fatted to be converted into brawn. But experience proves that a moderate-sized pig, which is prolific, and at the same time fattens at an early age, is much more profitable. A cottager will have a profit on fatting his small hog to ten score, while the farmer will loose money with a huge animal which attains twenty or twenty-five score when fat. A cross with the small Chinese improves almost every native breed, by lessening the size and producing more numerous litters.

The following are the principal fairs in Oxfordshire:—

Brampton, March 26, Aug. 26; Banbury, Thursday after Jan. 18, second Thursday before Easter, Holy Thursday, Aug. 13, Oct. 30; Bicester, Friday in Easter week, Whit-Monday, Aug 5, Dec. 17; Burford, last Saturday in April, July 5; Charlbury, Jan. 1, second Friday in Lent, second Friday after May 12, Oct. 12; Chipping-Norton, March 7, May 6, July 18, Sept. 4, Oct. 3, Nov. 8; Deddingham, Aug. 21, Nov. 22; Henley, March 7, Holy Thursday; Oxford, May 3, Monday after Sept. 1; Thame, Easter Tuesday, Oct. 11; Watlington, April 5, Saturday before Oct. 10; Witney, Thursday in Easter week, Aug. 24, Thursday before Oct. 10, Thursday after Dec. 1; Woodstock, Tuesday after dlemas-day, April 5, Oct. 2, Dec. 17.

Divisions, Towns, &c.—Oxford is divided into fourteen ndreds, as follows:—

Hundreds.		Situation.	Acres.	Population.
Bampton	.	W.	42,070	14,710
Banbury	.	N.	21,230	11,449
Binfield	.	S.E.	23,040	8,607
Bloxham	.	N.	27,710	8,706
Bullington		Central & E.	46,630	12,857
Chadlington	.	N.W.	69,990	14,976
Dorchester	.	Central	11,280	3,257
Ewelme	.	S.	25,190	6,225
Langtree	.	S.	21,820	4,077
Lewknor	.	S.E.	19,780	5,096
Pirton	.	S.E.	14,190	3,319
Ploughley	.	N.E.	59,580	14,050
Thame	.	E.	10,580	4,734
Wootton	.	Central	67,590	17,907
City and Liberty of Oxford	.	Central	6,700	22,186
			467,380	152,156

Oxfordshire contains the city and university of Oxford, the borough and market towns of Banbury and Woodstock, and the market-towns of Bampton, Bicester, Burford, Chipping-Norton, Henley-upon-Thames, Thame, Watlington, and Witney. Of these, BAMPTON (population, in 1831, 1605), BANBURY (population, in 1831, 3737), BICESTER (population, in 1831, 2868), and WOODSTOCK (population, in 1831, 1380, but parliamentary limits much enlarged by Boundary Act), are described in their respective articles. The others we shall notice here.

Oxford is on the left or north-east bank of the Isis or Thames, just above the junction of the Charwell, which flows on the east side of the town. The Isis is divided at and near the town into several channels.

The origin of Oxford is unknown. The name is probably derived from there having been a ford or passage for oxen across the Thames here: it was written by the Saxons Oxnaꝼoꞃd, and in Domesday, Oxeneford. Early in the eighth century a monastery was founded here and dedicated to the Holy Trinity. Alfred is said to have coined at this town money which bore the inscription Ocsnafordia. In the Danish ravages Oxford was repeatedly injured or destroyed. Edmund Ironside died at Oxford in the year 1016, probably by assassination. Canute, his successor, frequently resided at Oxford, and held the great council of the nation here several times. Harold Harefoot, son and successor of Canute, was crowned and died at Oxford.

On the invasion of England by William the Conqueror, the townsmen of Oxford refused to admit the Normans, and in the year 1067 the town was stormed by William. In consequence of this disaster or of the other oppressive measures of the government, it suffered so much, that, according to Domesday Book, only 243 houses were able to pay the tax, while 478 houses were so 'wasted and decayed,' that they were not able to pay it; yet the unhappy townsmen were compelled to pay three times as much as in the time of Edward the Confessor. Further to bridle any attempt at revolt, a castle was built by Robert de Oilli, or Oilgi, on the site now partly occupied by the county gaol and the house of correction. The foundation of Oseney Abbey by Robert de Oilli, nephew of the builder of the castle, and the erection of a new hall or palace by Henry I., contributed to revive the prosperity of the town. In the beginning of the reign of Stephen (A.D. 1139), Oxford was the scene of a tumult, in which some persons of consequence were slain, and in consequence of which two bishops and other persons were apprehended. In the subsequent civil war, the Empress Maud was besieged in Oxford Castle by Stephen, but escaped in the night with three attendants, and the castle surrendered next morning. The ground was covered with snow, and the empress, with her attendants, clothed in white, passed unnoticed through the posts of the besiegers, and crossed the Thames, which was frozen over, on foot. The accommodation between Stephen and Henry II., by which the civil war between those princes was terminated, took place at a council held at Oxford. Several councils of state, or parliaments, were held at Oxford in the following reigns.

In the reign of Edward III. there were great dissensions arising from the theological or other disputes among the students, many of whom retired in a body to Stamford in Lincolnshire. The university and town suffered much at the same period from a pestilence, which carried off a fourth part of the students.

The doctrines propagated by Wickliffe occasioned, in the reigns of Richard II. and Henry IV. and V., much disputation and dissension at Oxford, insomuch that at one period the University was threatened with dissolution. These tumults, together with the civil war of the Roses, which occurred several years after, much depressed the place; and a dreadful pestilence soon after the accession of Henry VII. nearly depopulated the city and the colleges. The same reign was marked by the revival of the study of Greek by Erasmus, who was at Oxford in 1496. The tumults of the Reformation further tended to depress the University. In the martyrdoms of Mary's reign, those of bishops Ridley and Latimer (October, 1555), and a few months later that of archbishop Cranmer (March, 1556), took place at Oxford, in front of Baliol College.

In the reigns of Elizabeth, James I., and Charles I., the University, on which the prosperity of the town much depended, recovered in a great degree from its previous depression, and in the civil wars of Charles I., after once or twice changing masters, Oxford became the head-quarters of the king, who collected here those members of parliament who adhered to him. The members of the University supported the royal cause with great zeal; but Oxford was at last obliged to surrender, after the battle of Naseby, to the parliamentarians under Fairfax. The University was depressed under the Commonwealth, but revived on the Restoration, and in the reign of Charles II. two parliaments were held at Oxford, A.D. 1665 and 1681. In the reign of James II. the University firmly resisted the illegal proceedings of that prince, who paid Oxford a visit, and sternly rebuked and then expelled the contumacious members, whom however, from motives of fear, he afterwards restored. Subsequent to the Revolution, Oxford was regarded as the seat of Jacobite principles; and in 1715, during the rebellion in Scotland, General Pepper, with a body of dragoons, took possession of the city, confined the students to their respective colleges, and after apprehending some individuals and seizing the property of others, retired to Abingdon. A regiment of foot was afterwards quartered at Oxford to overawe the disaffected.

The city lies on a point of land nearly insulated. The city and liberty, exclusive of the borough of Woodstock and the extra-parochial district of Blenheim park, which are included in the liberty, comprehended, in 1831, an area of 1840 acres. On the east it is bounded by the Charwell or Cherwell, on the south by the main channel of the Isis, and on the west by the smaller channels of that river. It is irregularly laid out; the two principal lines of street are Bridge Street, Fish Street, the Corn Market, and St. Giles's Street, which form one line running from south to north, from the Abingdon road to the Woodstock and Birmingham road; and (Magdalen) Bridge Street and High Street, which run from the London road on the east into Fish Street and the Corn Market on the west, thus forming a ⊢ with the line just described. The other streets are for the most part parallel to these, or open into them at right angles. The town is nearly surrounded by meadows.

Oxford has much increased of late years; new streets, elegant houses, both in rows and detached, and a number of smaller tenements, have been erected. The streets are well paved and cleansed, and are lighted with gas. The police and night watch, which are regulated by the University authorities, and maintained at their expense, are very effective. The public buildings, chiefly connected with the University, are numerous, and many of them striking from their magnitude, antiquity, or beauty.

On entering the city on the east side by the London road, over Magdalen Bridge, the buildings of Magdalen College present themselves on the north side of Bridge Street, immediately adjacent to the banks of the Charwell. The college buildings are for the most part of the fifteenth century, and present some very curious features. The hall, chapel, cloisters, and entrance tower are antient; the tower is characterized by elegance and simplicity; it is crowned with eight rich pinnacles. Queen's College, in High Street, is of Grecian architecture. Nearly opposite to Queen's is University College; it presents a front of more than 260 feet to High Street, and has two gateways, each surmounted by a tower; the architecture presents some examples of Italian details mingled with more antient (or Gothic) forms. On the same side of High Street as Queen's is All Souls' College, at the corner of the opening from High Street into Radcliffe Square. It has a gateway, and some other Gothic portions of good perpendicular character, but these antient parts are mingled with others of later and incongruous architecture. Several parts of the interior, separately considered, are worthy of admiration. The opening from the High Street, just referred to, presents numerous edifices of striking character. The eastern side is occupied by All Souls' College, and the buildings of the now extinct foundation of Hertford College. On the western side is Brasen-Nose College, the buildings of which are chiefly of the earlier part of the sixteenth century, with some modern alterations or additions; the entrance-gate is a fine Gothic composition, with very good details. Between the eastern and western sides of the opening from the High Street are St. Mary's church, forming the south side of Radcliffe Square, the Radcliffe Library in the centre of the square, and the Schools forming the north side. Near the Schools the square communicates with Broad Street and Holywell Street, which form a line parallel to High Street. St. Mary's is a fine church, of good perpendicular character, except the steeple, which is of decorated character, and a porch which is of later and incongruous architecture, with twisted pillars. The church consists of a spacious nave and aisles, and a chancel without aisles. The steeple is plain, and is surmounted by a spire. The total height is 180 feet. The members of the University commonly attend divine service here. The building which contains the Radcliffe Library has a rustic basement, forming a regular polygon of sixteen sides, and of 100 feet diameter; from this basement rises a circular story divided into sixteen compartments by pairs of Corinthian columns, and surmounted by a balustrade, the compartments being occupied alternately by windows and niches. An upper circular story of much smaller diameter, surmounted by a cupola and lantern, completes the elevation. The interior is splendidly adorned, and the whole building constitutes one of the most striking edifices in the city. The 'Schools,' with the picture gallery and part of the Bodleian Library, form a quadrangle to which the rest of the Bodleian Library adjoins. The architecture of the Schools is chiefly Gothic, the exterior of a debased character, except some small portions, which are of fine composition; the interior of the Divinity School is fine, especially the roof. The Bodleian or public Library is one of the most valuable in Europe: the picture-gallery contains some interesting portraits. To the north of the Schools is an open square, the north side of which, towards Broad Street, is formed by the Clarendon (formerly the University) Printing-Office, a fine building of two stories, 115 feet long, with a Doric portico. The building was erected in 1711, from the designs of Vanbrugh. Near the Clarendon Printing-Office is 'the Theatre,' used for the more public or solemn assemblies of the University, and calculated to hold nearly 4000 persons. It is a commodious building; the part opposite the Divinity-School has a fine elevation adorned with Corinthian columns. The University press was formerly worked in the Theatre, and many of the books printed in it have a representation of the building as a vignette in the title-page.

The Museum, sometimes distinguished as the Ashmolean Museum, occupies a building adjacent to the Theatre. The collection was originally formed by the Tradescants, celebrated naturalists and herbalists of Lambeth near London, augmented by Ashmole, who presented it to the University [ASHMOLE], and further augmented by Dr. Plot and Edward Llwyd, the first keepers of the Museum, by Borlase, the historian of Cornwall, and by Reinhold Forster. The building was erected by Sir Christopher Wren. Not far from the Museum, situated back from the main streets, are Lincoln, Exeter, and Jesus Colleges. The chapel of Exeter College is a neat Gothic erection of perpendicular character. On the north side of the town, not far from the Clarendon Printing-Office, is Wadham College, the architecture of which presents an intermixture of Italian features with the elder Gothic style.

In the notice of the above-mentioned buildings we have arranged them according to their locality, proceeding from the London entrance into the centre of the town. The following are near the southern or Abingdon entrance, which is by a long bridge, or succession of bridges, over the arms of the Isis or Thames. Christ-Church College is on the eastern side of Fish Street, and consists of the great quadrangle, and another quadrangle called Peckwater, besides smaller portions. The buildings are partly of Gothic architecture and perpendicular date; but chiefly belong to a later period. The hall, built by Cardinal Wolsey, is very fine, and the entrance tower, containing the great bell, 'Tom of Oxford,' is much admired. Near the college is the cathedral of Christ-Church, which is so enclosed by college buildings and by gardens, that no good view of the whole can be well obtained. It formerly made part of the monastery of St. Frideswilde, founded about A.D. 727, for nuns, afterwards occupied by secular canons, and afterwards by regular canons of St. Austin. The monastery was suppressed by the Pope at the desire of Wolsey, in order to the establishment of the Cardinal's intended college of Christ-Church, and was subsequently (A.D. 1545), by Henry VIII., made the seat of a bishopric. The church, which is inferior to most of our cathedrals, is in the shape of a cross, with a tower and spire at the intersection of the nave and transepts. The nave and choir have each two side aisles; the north transept has an aisle on the west side; the south transept an aisle on the east side. The dimensions are given by Browne Willis as follows:—length 154 feet (155¼ feet Britton's *Cathedral Antiquities*); breadth of body and side aisles 54 feet (52 feet 10 inches, Britton); length of the transepts from north to south 102 feet; the north transept is longer than the south by one arch; the height of the roof in the western part is 41½ feet; in the eastern part or choir part, on account of the vaulting, 4 feet lower; the height of the steeple is 144 feet (146 feet, Britton). On the north side of the choir are two large chapels, the Dean's Chapel and the Latin Chapel; and on the south side of the building are the cloisters and the chapter-house, and some other apartments. The general character of the building is Norman (or, as it is sometimes called, 'Saxon'), with additions and insertions of later date. Some of our antiquaries have ascribed the erection of this church to Ethelred II. (A.D. 1002 or 1004); others, with better reason, fix the erection in the twelfth century. The chapter-house is of later date than the main building, and is a valuable specimen of the early English style, with a doorway of enriched Norman; the tower is of plain early English architecture, and the remains of the cloisters are of perpendicular date. The roof of the choir is curiously and beautifully groined, with pendants. The interior of the church has many portions deserving of attention; some of the most striking parts are of perpendicular character. The cathedral is not unfrequently overlooked by those who visit Oxford, their attention being drawn rather to the colleges than to this church. Oxford cathedral is the chapel of Christ-Church College.

In the same line of street with Christ-Church College are the churches of St. Aldate, St. Martin (or Carfax church), St. Michael, and St. Mary Magdalen, and St. John's College. The college is of mixed Gothic and Italian architecture; the church of St. Michael has an elegant though plain perpendicular porch, and some other antient portions; that of St. Mary Magdalen is mostly in the decorated style, and has some parts of remarkably beautiful composition. St. Giles's church, in the same line of street, near the northern entrance of the town, has various early English portions. The other buildings of Oxford lie back from the principal streets. New College is behind Queen's College and the late Hertford College; it has a hall, chapel, cloisters, and a bold bell-tower, of excellent perpendicular character; the chapel has been restored, and a rich screen and organ-case erected. Baliol and Trinity Colleges are near St. Mary Magdalen church; the former has some antient features. Corpus Christi, Oriel, Merton, and Pembroke Colleges are near Christ-Church College and the cathedral. Merton is rich in antient portions, and has one of the finest chapels in Oxford; it consists of the choir and transepts of a cruciform building, without any nave; there is a tower at the intersection. The choir is of decorated English character, the transepts and the tower are of perpendicular character; the tower is short and massy, surmounted by an elegant belfry story, with a pierced battlement and eight pinnacles. Worcester College is on the west side of the town. There are, besides the colleges, five halls. Of the churches, besides those already mentioned, the most worthy of notice is that of St. Peter in the east; it is originally of Norman architecture, with rich and well executed details. There is a fine Norman crypt beneath the choir. The additions are chiefly of perpendicular character.

There are some remains of Oxford castle and of the antient town wall, as well as of the works raised for the defence of the town in the civil war of Charles I. The town county hall is a spacious stone building; the county- is on the site of the castle, and there is a town-gaol or bridewell. The other chief public buildings are the Music-hall and the Radcliffe Infirmary. There are several alms-houses or school-houses, a Catholic chapel, and some Methodist or Dissenting places of worship. In the western part of the city are some remains of Rawley Abbey.

The population of the city of Oxford, in 1831, was 20,649, including the inmates of the several colleges, who amounted to 1634. The population of the adjacent parish of Binsey, which is in the liberty of the city, was 74. No particular manufacture is carried on. The prosperity of the town depends mainly on that of the University, and on its being the mart for the surrounding agricultural district. Considerable traffic is carried on, partly by land, partly by the river, or by the Oxford canal, which here communicates with it. Oxford claims to be a borough by prescription; the earliest known charter was granted by Henry II. The corporation, by the Municipal Reform Act, consists of ten aldermen and thirty councillors. Quarter-sessions for the city, petty sessions weekly, a mayor's court, and a court of hustings are held. The city magistrates have no jurisdiction over members of the University. The city is divided into five wards. Its boundary, both for municipal and parliamentary purposes, was enlarged by the Boundary and Municipal Reform Acts, the additions are not included in the statements of area and population given above. Two members are returned to parliament by the University; the right of election is in the doctors and masters of arts, the vice-chancellor being the returning officer; and two members are returned by the citizens; the number of qualified electors, in 1835-6, was 2506. The University first sent members in the reign of James I.; and the city has sent members from the commencement of our present system of popular representation.

The livings in the city are all of small value; four are in the presentation of the lord-chancellor, nine in that of one or other of the colleges. The living of Binsey, a village adjacent to Oxford, also of small value, is in the gift of Christ-Church College.

The Education Returns of 1833 give for the city three infant or dame schools, with 150 children of both sexes; fifty-three other day-schools of all kinds, containing 972 boys, 688 girls, and 252 children whose sex was not stated. There were besides two boarding-schools, and one or two schools connected with Dissenters, of which no return was obtained. Some of the day-schools were also Sunday-schools; and there were nine other Sunday-schools, with 182 boys, 261 girls, and 70 children whose sex was not stated. Binsey contains only one school, a small Sunday-school, with 10 children, supported by endowment.

Burford is in Bampton hundred, on the southern bank of the Windrush, 18 miles west by north of Oxford, through Witney. The area of the parish, including the hamlet of Upton and Signet, is 2170 acres; the population, in 1831, was 1620 for the town, above one-sixth agricultural; and 246 for the hamlet, about half agricultural: together 1866. Burford was the scene of conflict (A.D. 752) between the rival kings of Wessex and Mercia, Cuthred and Ethelbald; the latter was defeated, and his standard, a golden dragon, taken. The scene of the engagement is still distinguished as 'Battle Edge;' and Dr. Plot informs us that 'within memory' the towns-people were accustomed to have an annual procession on Midsummer-eve, in which the figures of a dragon and a giant were carried in procession, in commemoration, as he supposes, of Ethelbald's defeat. Burford was the native place of Dr. Peter Heylyn, a well-known writer of the time of Charles I.

The houses of the town are antient, and, with a few exceptions, irregular and ill-built. Some of them have antient Gothic doors of good composition, and there are some fine wooden gables with pannels and hanging tracery. Burford has diminished in wealth and importance from the decay of the coarse woollen manufacture and the malting business, which once flourished here, and from the diminished traffic along the line of road which passes through the town. The church is a large antient cruciform building; it has a central tower of Norman date, a fine Norman doorway at the west end, and various portions of Norman and early English adjacent to the tower; but the greater part of the church is of perpendicular character and of various dates. The tower is crowned with a spire of perpendicular character. There are several large chapels; a stone chapel in the nave, of good composition, is used as a seat, and there is a wooden chapel, also of good composition. The south porch is a fine specimen of late perpendicular. The roof of the nave, now much mutilated and altered, has been of remarkably fine wood-work. There are several antient monuments, a wooden pulpit, and some other portions of good wood-work, a fine circular font lined with lead, with niches and statues, and a few small portions of very good antient stained glass. Under part of the church is a crypt, used as a bone-house. There are in the town some dissenting places of worship, a school-house, an upper room in which is used as the town-hall, and several almshouses. There was anciently a small priory or hospital, dedicated to St. John the Evangelist, the revenue of which was valued at the dissolution at 13l. 6s. 6d.; its site is occupied by a mansion, still called 'The Priory,' interesting from its having been the property of the excellent Lord Falkland and of the Speaker Lenthal. Much of the old house has been taken down and rebuilt; the present mansion contains some interesting historical portraits by Holbein, Vandyke, and Cornelius Jansen.

The market is held on Saturday, and there are three yearly fairs. The town was incorporated by charter of Henry II., and is said to have sent a member to parliament for one session, and to have been relieved, on petition, of this (at that time) costly privilege. The corporation has no jurisdiction, and of late years the officers have not been regularly elected. The county magistrates hold a petty-session here. The living is a vicarage, united with the chapelry of Fulbrook, of the clear yearly value of 294l., with a glebe-house, in the gift of the bishop of Oxford.

There were, in 1833, an infant-school with 97 children; a free grammar-school, with 30 boys on the foundation and about 20 others; eight other day or boarding and day schools, with 53 boys and 87 girls; and three Sunday-schools, with 422 children. A parochial library is kept in the church vestry-room.

Chipping-Norton is in Chadlington hundred, near the head of the river Evenlode, 19½ miles north-west of Oxford by Woodstock. The town is of considerable antiquity, and is a corporate town, but has no historical interest. The area of the parish is 3440 acres, or including the hamlet of Over-Norton, 4720; the population, in 1831, was, for Chipping-Norton, 2282, about one-fifth agricultural, and for Over-Norton, 355, more than half agricultural; together, 2637. The town is situated on the slope of a considerable eminence. The streets are partially paved, but not lighted. The upper part of the town is the best built. The houses are chiefly of stone, and, though not regularly built, are many of them substantial and even ornamental. The church is a venerable Gothic building, with an embattled tower at the west end; it consists of a nave, with side aisles and a chancel. The nave is lofty, and has an oak roof richly carved and painted; it is separated from the chancel by a wooden screen. There are some remains of the antient rood-loft. To the north of the church is the elevated site of the keep of an old castle. There is a town-hall, with a lock-up-house beneath it, a free school-house, some dissenting places of worship, and some almshouses.

There is a manufactory of woollen girths and horse-cloths, which, in 1833, employed fifty persons. Some of the townsmen are engaged in the Woodstock glove trade, but the majority of the work-people reside at a distance from the town. The agricultural district is flourishing, and there is scarcely any other market-town in a circuit of 13 or 14 miles round. The market is on Wednesday, and there are several yearly fairs or great markets for cattle. The corporation has jurisdiction over the parish, except the hamlet of Over-Norton; but a more restricted boundary has been proposed. The corporate body, under the Municipal Reform Act, consists of four aldermen and twelve councillors. The borough was not to have a commission of the peace, except on petition and grant. The living is a vicarage, of the clear yearly value of 129l., with a glebe-house. There were in the whole parish, in 1833, a free grammar-school, with 16 boys; a Lancasterian school, with 40 girls; fourteen other day or boarding and day schools, with 125 boys, 119 girls, and 20 children whose sex was not distinguished; and three Sunday-schools, with 270 children.

Henley-upon-Thames is in Binfield hundred, 22 miles from Oxford. The area of the parish is 1720 acres: the population, in 1831, was 3618, not one-tenth agricultural. Henley was anciently called Hanleganc and Hanneburg. Some Roman coins have been found here, but no mention of the town occurs until after the Conquest. In 1643 it was the scene of a skirmish between the troops of Charles I. and those of the parliament. Henley is delightfully situated on a gentle ascent from the west or left bank of the Thames, amid hills covered with extensive beech woods and other plantations. The town consists of four principal streets, well paved and lighted, having a plain stone cross and conduit at their intersection: several of the houses are spacious and handsome. The entrance to the town on the east side is by a handsome stone bridge of five arches over the Thames. The church is in the eastern part of the town; it has a good tower, and several interesting portions both of decorated and perpendicular character. The east window has some good decorated tracery; and some parts of the masonry are of chequered work in flint and chalk. The town-hall in the High-street is supported by sixteen Doric columns, forming a piazza used as a market-house; the building contains a hall and council-chamber, with some rooms, and a place of temporary confinement in the basement. There are some dissenting places of worship, some almshouses, and a small theatre.

The market is on Thursday, and there are four yearly fairs. Henley is a corporate town. The boundaries of the borough are not co-extensive with those of the parish, but comprehend the greater part of the town. The officers consist of a mayor, recorder, ten aldermen, of whom the mayor is one; and sixteen burgesses, of whom the bridgemen are two. Quarter-sessions for the borough are held; the Court of Record has fallen into disuse. The borough was left untouched by the Municipal Reform Act. The living is a rectory, of the clear yearly value of 427l., with a glebe-house, in the patronage of the bishop of Rochester. There were, in 1833, an infant-school, with 165 children; a grammar-school, with 19 boys; a charity-school, with 64 boys; a national-school, with 124 boys and 72 girls; seven other day-schools, with 60 boys and 101 girls; and 'a few small schools kept by old people.' There is a savings' bank; and in the vestry of the church is the library of Dean Aldrich, rector of Henley, who died in 1737, and bequeathed his library for the free use of all the inhabitants paying church-rates. The Speaker Lenthal was a native of Henley.

Thame is in the hundred of Thame, and on the south bank of the river Thame, a feeder of the Thames, 47½ miles from the General Post-office, London, through High Wycombe and Stokenchurch. The area of the parish is 5310 acres; the population, in 1831, was 2885, about half agricultural. Thame suffered considerably in the Danish wars. In the civil war of Charles I. and the parliament, several skirmishes were fought near the town, which was surrounded by the garrisons of the contending parties. Thame consists chiefly of one long and spacious street: the market-place is tolerably commodious. The church is a large and handsome building, cruciform, and consists of a nave with side aisles, transepts, and chancel, with a fine embattled tower at the intersection of the nave and transepts, supported on four massive pillars. The architecture is early English. The entrance to the church is by a stone porch, adorned by a canopied niche, which once contained a statue of the patron saint; and the church contains several antient monuments. Near the church are the school-house, a large and noble building, with a fine school-room; and the ruins of the antient prebendal house of Thame. The school was founded by the will of Lord Williams of Thame (A.D. 1558), and among the persons educated in it were Bishop Fell, Pococke the Orientalist, Anthony à Wood, and others.

The market is held on Tuesday, and is a considerable market for corn and cattle. There are two yearly fairs, if not more. A little lace is made in the town. The river Thame is navigable from this place. The living is a vicarage, united with the vicarage of Towersey and the chapelries of Tetsworth and Sydenham, of the joint yearly value of 300l. There were in the parish, in 1833, a free-school, with 24 boys on the foundation and 30 others; a school, with 17 children, supported by subscription; and three other day or boarding schools, with 80 children; and four Sunday-schools, with 195 boys and 224 girls. The grammar-school had no pupils.

Watlington is in the hundred of Pirton, about 16 miles from Oxford. The parish has an area of 3440 acres; the population in 1831 was 1833, nearly half agricultural. The town consists of narrow streets, irregularly laid out; the houses are mean and ill built, chiefly of brick. The market-house is a substantial brick building. The church, an antient building on the north-west side of the town, contains some neat monuments. There are several Dissenting meeting-houses. A few females are engaged in lace-making, for which there is a school, attended by 30 or 40 girls: there are some corn-mills near the town. There is a small market on Saturday, and two yearly fairs. Petty sessions are held here once a fortnight. The living is a vicarage, of the clear yearly value of 175*l.* There were in the parish, in 1833, an endowed day-school, with 20 boys; two boarding-schools, with 19 boys and 20 girls; and three Sunday-schools, with 254 children.

Witney is in the hundred of Bampton, on the banks of the Windrush, chiefly on the western bank, 11 miles from Oxford. The area of that part of the parish in which the town stands is 440 acres; the population in 1831 was 3190, scarcely any part agricultural; there are beside this, the four hamlets of Crawley, Curbridge, Hailey, and Lew, with an aggregate area of 7010 acres, and a population of 2146, more than half agricultural: giving for the whole parish 7450 acres and 5336 inhabitants. Witney was a place of some consequence at an early period. It sent members to parliament in the time of Edward II., but discontinued doing so in the following reign. The manufacture of blankets was early established here, and Dr. Plot says that in his time 3000 persons were engaged in the weaving business, from children of eight years to decrepit old people. In the latter part of the last century, the manufacture declined greatly. The introduction of machinery has again extended it; and in 1831 it employed about 200 adult males in the town and 70 in the adjacent hamlets, besides females and children. The town is in a pleasant situation, and consists of two principal streets. The houses are generally of respectable appearance, and many of them spacious and handsome. Few towns containing so many inhabitants, especially with a large proportion of them engaged in manufacture, retain so quiet and rural an appearance. There are in the High Street a 'staple or blanket hall,' a handsome building, erected A.D. 1721; a town-hall, built of stone, with a piazza underneath for a market-house; and a market-cross, built A.D. 1683, and repaired A.D. 1811. The house for the free-school, comprehending a spacious school-room, a room annexed for the library, and the master's apartments, is a respectable building. 'The church is a large and handsome cross church, with a tower and a lofty spire at the intersection; the nave has aisles and a clerestory; the transepts are large, and the chancel small. The tower and chancel are early English, and the north transept decorated with a fine window of seven lights; the clerestory and some other parts are perpendicular.' (Rickman.) There are several dissenting meeting-houses. The manufacture of rough coatings, of tilts for barges, of felt for paper-makers, and of gloves, is carried on to a small extent; wool-stapling is extensively carried on, and there is a considerable malt-trade. The Witney blankets are of superior texture and good colour. The market is on Thursday, and there are several yearly fairs.

The living is a rectory, of the clear yearly value of 1290*l.*, in the gift of the bishop of Winchester. There were in the town of Witney, in 1833, one dame-school, with 15 children; the free grammar-school, with 16 boys; an endowed charity school, with 15 boys and 25 girls; two national schools, with 110 boys and 70 girls; five other day or boarding schools, with 47 boys and 97 girls; and two Sunday-schools, with 306 boys and 329 girls. The national schools were attended by 70 boys and 50 girls on Sundays.

Beside the above market-towns, the county contains several large villages. Ensham, or Eynsham, is on a hill on the northern bank of the Thames, in Wootton hundred, about five miles from Oxford on the road to Witney. The area of the parish is 5060 acres; the population in 1831 was 1859, two-thirds agricultural. The village is in a picturesque situation; it has two bridges, one of which is over the Thames. The parish church is a large Gothic building, with a substantially built western tower; and near the church is an antient cross, with a taper shaft of elegant proportions. Ensham had formerly a Benedictine Abbey, the yearly revenue of which, at the dissolution, was 441*l.* 12*s.* 2¾*d.* gross, or 421*l.* 16*s.* 1¾*d.* clear. There are some [illegible] remains of the building. The living is a vicarage, of yearly value of 178*l.*, with a glebe-house. There 833 an endowed school, with 14 boys and 4 girls; three other day or boarding schools, with 40 boys and 63 girls; and two Sunday-schools, with 90 children.

Deddington is in Wootton hundred, 17 miles from Oxford. The area of the parish is 2350 acres, or, including the hamlets of Clifton and Hempton, 3990 acres; the population in 1831 was 1590, or with the hamlets 2078. There was antiently a castle here, but only the earth-works and perhaps some traces of the foundations remain. It was at Deddington that the Earl of Warwick seized Piers Gaveston. It was at this time a market and corporate town, and sent members to parliament. It was relieved from the burden of sending members, on petition, in the following reign. The corporation has fallen into disuse, and the market has of late years been discontinued. There is a cattle-fair yearly. The houses of the village are, with few exceptions, small, and are built of an ordinary stone quarried in the neighbourhood. The church is antient, and contains some portions worthy of examination. The living is a vicarage, of the clear yearly value of 133*l.*, with a glebe-house. In the whole parish there were, in 1833, ten dame-schools, with about 110 children; a national school, with 100 boys and 90 girls (124 boys and 100 girls on Sunday); and a Sunday-school with 26 boys and 50 girls. Chief Justice Scroggs was a native of Deddington.

Hook-Norton is in Chadlington hundred, near Chipping-Norton. The area of the parish is 3730 acres; the population in 1831 was 1506, two-thirds agricultural. There was a battle fought here between the Saxons and Danes in the time of Edward the Elder; a barrow in the parish is thought to be a memorial of this engagement. The living is a perpetual curacy, of the clear yearly value of 180*l.* There were in the parish, in 1833, three dame-schools, with 22 boys and 23 girls; a national school, with 30 girls; four other day or boarding schools, with 55 boys and 37 girls; and two Sunday-schools, with above 200 children.

Charlbury is in a detached portion of Banbury hundred, between Chipping-Norton and Witney. The area of the parish is 4810 acres, or, including the dependent hamlets of Fawler, Finstock, and Walcott, and the chapelries of Chilson and Pudlicot, and of East Chadlington (with the tithing of West Chadlington), 11,320 acres; with a population, in 1831, of 1433, or including the dependencies, of 3027. There are four yearly fairs. The living is a vicarage united with the chapelries of Chadlington and Shorthampton, of the joint yearly value of 800*l.*, with a glebe-house, in the gift of St. John's College, Oxford. There were in 1833, in the whole parish, four dame-schools, with 28 children; a Lancasterian school, partly supported by endowment, with 94 boys and 76 girls; a school supported by subscription, with 10 boys and 10 girls; eight other day-schools, with 63 boys, 45 girls, and 109 children of sex not distinguished; and seven Sunday-schools, with 328 children. There is a valuable endowment for a grammar-school, but the school is not kept up. There is a lending library at Charlbury.

Headington is in Bullington hundred, about 1½ mile north-east of Oxford. The parish has an area of [illegible] acres, with a population, in 1831, of 1388, about one-fourth agricultural. Headington is supposed to have been a royal residence under the Saxon dynasty. The village is pleasantly situated on a hill, which commands a fine view of Oxford; and contains some neat and commodious buildings. The church is antient, but the tower was rebuilt A.D. 1689; there is a lofty shaft of a cross in the church-yard. A short distance from the village is a stone-quarry from which much of the stone has been taken for the various buildings at Oxford; it is however only suited to the more substantial parts, being too porous and too coarse in the grain for ornamental work. The living is a rectory, of the clear yearly value of 118*l.* The were in 1833, an endowed school, with 20 boys and 10 girls; five other day-schools, with 36 boys and 36 girls; and two Sunday-schools, with 39 boys and 31 girls.

Caversham is in Binfield hundred, on the north bank of the Thames, about one mile from Reading in Berkshire. Here was formerly a cell of regular canons of St. Austin, belonging to Noctele or Nutley Abbey in Buckinghamshire, to which abbey the church also belonged. This church is small, and some parts are of great antiquity. Caversham was the scene of a smart skirmish during the siege of Reading by the Parliamentarians in the civil war of Charles I. The area of the parish is 5100 acres; the population in 1831 was 1362, about half agricultural. The living is a perpetual curacy, of the clear yearly value of 116l., with a glebe-house. There were in 1833, a national school, with 98 boys and 53 girls; and three other day or boarding schools, with 51 girls and 15 boys; and two Sunday-schools, with 103 children.

Bloxham, in Bloxham hundred, near Banbury, has an area of 2980 acres, or, including the chapelry of Milcombe, 4740 acres: the population of Bloxham in 1831 was 1348, of Milcombe 225; together 1573. The village of Bloxham is of considerable extent. The church is a handsome building, with a lofty and elegant tower and spire; the west door has some curious carving in stone, representing the Day of Judgment. The living is a vicarage united with the chapelry of Milcombe, of the clear yearly value of 660l., with a glebe-house. There were in the whole parish, in 1833, three dame-schools, with 46 children; an endowed free-school with 35 boys; four other boarding or day schools, with 18 boys, 76 girls, and 20 children of sex not distinguished; and six Sunday-schools, with 92 boys, 75 girls, and 90 children of sex not distinguished.

Stokenchurch is in Lewknor hundred, on the road from London by High Wycombe to Oxford, 18 miles from Oxford. The area of the parish is 4060 acres; the population in 1831 was 1276, above one-third agricultural. The church is ancient and presents some peculiar features. Several Roman urns were dug up about a century ago. About 70 men in this parish and the adjacent parish of Chinnor (area 1790 acres, or, with the liberty of Henton, 2760 acres; population in all 1255) are employed in chair-making. The living of Stokenchurch is a chapelry united with the vicarage of Aston Rowant, of the joint yearly value of 176l., with a glebe-house. There were in 1833, one dame-school, with 20 children; two boarding or day schools, with 45 children; six lace-making schools, with 90 children; and three Sunday-schools, with 231 children.

Bensington, in speaking usually shortened into Benson, is in the hundred of Ewelme, on the road from London, by Henley-on-Thames, to Oxford. It is on the left or east bank of the Thames, a little above Wallingford. Bensington was a place of importance in early times. It was taken from the Britons by the West Saxons under Cuthwin, brother of Ceawlin, king of Wessex, A.D. 572. The West Saxons built a castle here for the defence of their frontier; this castle was reduced by the Mercians under Offa, who defeated Cynewulf of Wessex here, A.D. 775. The village has some good houses; the church is ancient, it has an east window of decorated character; the tower is modern. The living is a perpetual curacy, of the clear yearly value of 119l., with a glebe-house. There were in 1833, two day-schools, with 70 children; two day and Sunday schools, with 100 children; and one Sunday school, with 30 children.

Dorchester, at the junction of the Thame and the Isis or Thames, is in the hundred of Dorchester; the area of the parish is 900 acres; the population in 1831 was 888, chiefly agricultural. The termination 'chester' indicates that it was a Roman station; and it appears to have been the Durocina of Richard of Cirencester. The foundations of an ancient town wall (whether Roman or not our authorities do not state) are frequently dug up; an extensive embankment called Dykehills, near the village, has given scope for much conjecture; and Dorchester and its immediate neighbourhood have yielded an abundant harvest of coins and other relics of antiquity. The town appears to have been at the height of its prosperity in the seventh century, when it was made the seat of a bishopric, which comprehended the two kingdoms of Mercia and Wessex. The bishopric was subsequently diminished by the formation of new sees, but was still the largest in England, when the seat of it was removed to Lincoln, A.D. 1086. The place had however previously declined, owing to the ravages of the Danes. There was a castle built here, in the middle ages, of which little yet remains. In the year 1140 an abbey of Black Canons was founded here, which had at the dissolution a yearly revenue of 219l. 12s. 0d. Some parts of the building yet remain near the church. The church of Dorchester is a large and curious church, with portions of different dates mixed together. The building is imperfect and the plan of it very irregular. There are portions in all the varying styles of Gothic architecture, and other portions in which there is a transition from one style to another. The door at the western end of the north aisle is Norman, but the greater part of the church is of later date. There are some good antient monuments, and a very antient font. The fragment of the antient abbey has been converted into a cottage. There is a modern bridge over the Thames at Dorchester, built of Headington stone. The living of Dorchester is a perpetual curacy, in the jurisdiction of the peculiar court of Dorchester, of the clear yearly value of 100l. There were in the parish, in 1833, an endowed school, with 40 boys and 10 girls; two other day-schools, with 10 boys and 23 girls; and one Sunday-school, with 18 boys and 30 girls.

Divisions for Ecclesiastical and Legal Purposes.—This county is in the diocese of Oxford, of which, till lately, it constituted the whole. By virtue of an order in council, the archdeaconry of Berks has been transferred from the see of Salisbury, pursuant to the recommendation of the Ecclesiastical Commissioners; and it is further proposed to add the archdeaconry of Bucks, now in the diocese of Lincoln. All these are in the ecclesiastical province of Canterbury.

The diocese of Oxford is of late origin. After the dissolution of the monasteries, Henry VIII. proposed to establish eleven new bishoprics, of which he actually established six, the embarrassments consequent on his extravagance having interfered with the execution of the remainder of his project. Of the six bishoprics thus established, Oxford was one. The seat of it was at first fixed (A.D. 1542) in the magnificent abbey church of Osney, from which it was shortly afterward (A.D. 1546) removed to the far inferior structure in which it is now fixed. The diocese consisted of the county of Oxford, and formed one archdeaconry, that of Oxford, with the exception of ten parishes which are in the peculiar jurisdiction of Dorchester (formerly under Dorchester abbey), and a few other parishes, which are peculiars, or otherwise exempt. The archdeaconry is subdivided into the rural deaneries of Aston, Burcester or Bicester, Chipping-Norton, Cuddesden, Deddington, Henley, Witney, and Woodstock, and the deanery of the city of Oxford. The number of parishes in the diocese, including those of exempt jurisdiction, was given by Browne Willis (A.D. 1742) at one hundred and ninety-five; the number of churches and chapels was given by the same authority at two hundred and fifty, some of them however in ruins. The number of livings, in 1831, according to the Parliamentary Returns, was two hundred and six; the number of churches at the same period was one hundred and ninety-seven, of chapels thirty-one. The revenue of the bishopric, on the average of three years ending 1831, was returned at 3106l. gross, or 2648l. net; but it was expected materially to decrease. The revenue of the cathedral church is so united with that of Christ-Church College that it cannot be separately stated; the gross revenue at the above-mentioned period was 26,893l., the net revenue 12,203l., beside houses for the dean and canons. The establishment of the cathedral comprehends the bishop, dean, archdeacon, and eight canons, beside chaplains, clerks, choristers, and almsmen. The dean and canons have no separate revenues. The archdeaconry of Berkshire, now added to the diocese, comprehends the four rural deaneries of Abingdon, Newbury, Reading, and Wallingford.

The county is in the Oxford circuit. The assizes and quarter-sessions are held at Oxford, where the county gaol and house of correction stands. This prison can contain 137 prisoners, with separate sleeping-cells, or 308 when more prisoners than one sleep in a cell. The number of offenders committed for trial or bailed in the county, in 1837, was 272, of whom 89 were not prosecuted, or had no true bill found against them, or were acquitted on their trial; and 183 were convicted, 4 for capital offences. More than half the offenders were charged with simple larceny. Of the offenders, 101 were entirely ignorant, 139 could read and write imperfectly, and 22 could read and write well; the degree of instruction received by the rest could not be ascertained. There were 6 offenders under twelve years of age, and 27 more under sixteen. There is no county lunatic asylum.

Before the Reform Act, Oxfordshire returned nine members to parliament, viz. two for the county, who were elected at Oxford; two for Oxford city, and two for the University; two for the borough of Woodstock, and one for the borough of Banbury. By the Reform Act three members were to be returned by the county, the place of election continuing as before at Oxford; and the polling-stations being Oxford, Deddington, Witney, and Nettlebed, between Henley and Oxford. Woodstock was reduced to one member; so that the total number remained as before.

History and Antiquities.—The county was probably divided between the two Celtic nations, the Catyeuchlani and the Dobuni; of whom the former held the eastern and the latter the western parts. The Dobuni were in subjection to the Catyeuchlani, and upon the approach of the Romans, under the propraetor Aulus Plautius, readily submitted to him. In the Roman division of the island, Oxfordshire was included in the province of Flavia Cæsariensis.

The most remarkable monument of this early period, if indeed it may be referred to it, is the singular group of Rollrich or Rowldrich stones, about three miles north-west from Chipping-Norton. These stones are near the north-western slope of the long range of hills which skirt the county on that side, along the border of Gloucestershire and Warwickshire. They form a ring, not exactly circular, of about one hundred feet diameter, and appear to have been originally sixty in number; there are now however only twenty-four that are more than one foot above the level of the soil, nor do any rise more than five feet above the ground, except one, precisely at the northern point, which exceeds seven feet; the thickness of this stone is considerable, but not uniform; the thickness of the others rarely exceeds thirteen or fourteen inches. The whole appear to have been taken from a neighbouring quarry and placed in their present situation in a rude and unformed state. The entrance to the circle appears to have been on the north-east; but there are no marks of any surrounding trench, or any avenue of approach; neither have any indications of burial been discovered. About two hundred and fifty feet north-east of the circle, opposite the entrance, is a single stone, popularly termed 'the king-stone,' nine feet in height; and on the east are the remains of another group, called 'the Five Knights.' The conjectures of antiquaries as to the origin of this monument are very contradictory, and some of them sufficiently absurd.

Several antient British or Roman roads crossed this county. Icknield Street or Way crossed the narrow part of it just under the Chiltern Hills, passing near the town of Watlington to the banks of the Thames at Goring, between Wallingford and Reading. Akeman Street crossed it in the wider part, passing through the Roman station at Alchester, near Bicester; and then passing near Woodstock, Witney, and Burford. Another road ran northward from Dorchester on the Thames to Alchester, and from thence into Northamptonshire; and one road from Londinium (London) ran north-westward to Alchester, while another, crossing the Thames north of Henley, ran to Wallingford. None of the towns or stations mentioned by Ptolemy, or in the 'Antonine Itinerary,' were in this county. At Alchester are the remains of a square camp or station, with a ditch and bank, the sides facing the four cardinal points. It is said (Reynolds, *Iter Britanniarum*) that many parts of the streets can be traced. Some have proposed to fix here the station Isanavatia, which others identify with Burnt Walls, near Daventry [NORTHAMPTONSHIRE]; but it seems more likely to have been the Aelia Castra of Richard of Cirencester. Numerous coins and other antiquities have been discovered here; Roman bricks are frequently found in the fields, and foundations are turned up by the plough. The neighbouring town of Bicester and the village of Great Chesterton bear in their names traces of Roman occupation. Dorchester on the Thames was probably the Dorocina of Richard. No other Roman town or station has been identified, but urns, coins, and other antiquities have been found at various places. There are traces of a Roman camp near Chadlington, in the neighbourhood of Chipping-Norton, and of another near Kiddington, between Chipping-Norton and Woodstock; the latter is in excellent preservation, though little noticed. Remains of tessellated pavements have been dug up at Steeple Aston, between Deddington and Woodstock, at Great Tew and Wigginton, between Deddington and Chipping-Norton, and at Stonesfield, near Woodstock; the latter was thirty-five feet by twenty, and the tessellæ were of seven different colours. Many years after this discovery, the areas of several large partments with tessellated pavements were found on the me spot, together with a brick hypocaust with funnels and a bath with lead pipes in the sides covered with plaster painted red. The Roman bricks appeared fresh and sound. At Wilcot, south of Charlbury, are the vestiges of a Roman work for making bricks, tiles, and stucco; also a tumulus with fragments of Roman bricks and cement. Wilcot, Stonesfield, and Alchester are all near the line of Akeman Street.

In the conquest of the island by the Saxons, Oxfordshire was the scene of conflict on different occasions. The West Saxons, under Cynric, their second king, and his son Ceaulin, or Ceawlin, or Cealwin, defeated the Britons at Beranbyrig, perhaps Banbury (A.D. 556). In the following reign of Ceawlin, or Cealwin (A.D. 571 or 572), Bensington and Eynsham were taken from the Britons; but the acquisitions of the West Saxons north of the Thames appear never to have been permanent. Cynegils, and his brother or son Cwichelm, joint kings of Wessex, defeated the Britons at Beamdune, or Bampton (A.D. 614); and the circumstance of the Britons being parties to this conflict, renders it probable that the county had not yet been wrested from them. The extension of the Mercian power under Penda probably led to its subjugation. The see of Dorchester (established about 635 or 638) is said to have comprehended the two kingdoms of Wessex and Mercia: it is therefore probable that Mercia by this time comprehended Oxfordshire, in which case the see was appropriately fixed on the frontier of the two kingdoms. In the year 752 a battle was fought at Burford between Cuthred of Wessex and Ethelbald of Mercia, in which the former, who had revolted against the supremacy of Ethelbald, was victorious, and regained his independence. Probably also he succeeded in uniting some parts of Oxfordshire to Wessex; for in 775 Offa took Bensington from the West Saxons, after gaining a victory over the king Cynewulf. When the Anglo-Saxon kingdoms were destroyed, either by the growing power of Wessex or the invasion of the Danes, Oxfordshire was included in that part of Mercia which was under the West Saxon crown; but on the death of Ethelred, ealdorman of Mercia, Edward the Elder, the West Saxon king, took Oxford under his immediate government, leaving the rest of the county to Ethelfleda, his sister, the widow of Ethelred. The county suffered much in the struggle which Ethelred I. and Edward the Elder had to maintain against the Danes: it suffered again when the struggle was renewed, in the reigns of Ethelred II. and Edmund Ironside. Upon the division of the kingdom between the latter and Canute (A.D. 1016), Oxfordshire appears to have fallen to Canute; and about this time (A.D. 1015 and 1018) two great councils or assemblies of Danes and English were held at Oxford. In the time of the Confessor, Oxfordshire was included in the earldom of Gurth, the brother of Harold. (Palgrave's *Rise and Progress of the English Commonwealth*, *Proofs and Illustrations*)

Of this troubled period there are several memorials in the encampments, which may be traced in different parts of the county. There are camps or other earthworks on Britwell Hill, near Watlington; at Dyke Hills, near Dorchester; near Bensington; near Wootton, in the neighbourhood of Woodstock; at Knollbury Banks, between Chadlington and Saresden, in the neighbourhood of Chipping-Norton; at Madmarston, or Mad Mason, and in another place near Tadmarton, between Banbury and Chipping Norton. The authors and date of these works cannot now be ascertained. The works at Dyke Hills consist of a double entrenchment, three-quarters of a mile long, the banks are sixty feet asunder at bottom, and their perpendicular height is twenty feet: the entrenchment constitutes the chord of an arc formed by the junction of the Thame and the Isis or Thames, to which it is adjacent. The vallum of the camp at Knollbury Banks is very steep, and is composed of rubble-stone cemented, and coated with turf. At Mongewell, on the Thames, below Wallingford, is a remarkable vallum or high ridgeway, extending south by east nearly two miles and a half in the direction of Nuffield, near which the bank becomes double, with a deep trench between. It is called Grimes Dyke, or popularly, Grime's Ditch, or Devil's Ditch. Dr. Plot was told that it held on its course to the Thames below Henley, where it crossed the river into Berkshire; but it cannot now be traced beyond Nuffield in that direction. There are several barrows in the county, chiefly on the north-western side.

The subsequent events which occurred in the county until the War of the Roses were chiefly connected with the town or castle of Oxford, and have been noticed above. In the reign of Richard II., Robert de Vere, earl of Oxford, was defeated at Radcot Bridge, near Bampton, by the insurgent nobles (A.D. 1387). In the War of the Roses, a great battle was fought near Banbury (A.D. 1469), between the northern insurgents, under their captain, Robin of Redesdale, and the Yorkist or royalist army, under Herbert, earl of Pembroke. The earl had quarrelled with his coadjutor, Lord Stafford, by whom he was abandoned. He was defeated and taken, and next day beheaded by the rebels. No other event of interest occurred in the county before the Reformation.

Of the Anglo-Norman period there are several monuments in the ruins of castles and religious edifices, but none of them of great extent. Of Oxford and Banbury castles there are scarcely any traces; Dorchester Castle has entirely disappeared. Of Bampton Castle there are some remains, now converted into a farm-house: this castle was probably of the date of Edward II. or III., but the interior has some ornaments of later date, especially a representation of the Red and White Roses united. Broughton Castle, near Banbury, is surrounded by a broad and deep moat, crossed by a bridge of two arches. An antient tower forms the entrance to the court, and several other parts of the antient edifice are standing, to which some additions of a later date have been made. There are castellated or other antient mansions at Castleton, near Chipping-Norton; the High Lodge, near Woodstock; at Astall, or Asthall, near Witney; in Holton Park (the old mansion), between Stokenchurch and Oxford; and at Stanton Harcourt, near Bampton, where is a kitchen resembling the abbot's kitchen at Glastonbury.

There are some fragments of Minster Lovel House, near Witney. The chief part of the mansion was pulled down nearly a century ago: but the current story of the body of Lord Lovel (one of the supporters of Perkin Warbeck, supposed to have been killed in the battle of Stoke by Newark, A.D. 1487) [NOTTINGHAMSHIRE] having been found in a vault, is without solid foundation.

The chief ecclesiastical buildings are the churches of Oxford (the cathedral especially), Burford, Henley, Dorchester, and Witney, mentioned above. Iffley Church is principally Norman, with an addition to the chancel of early English character, and some inserted windows of decorated and perpendicular date. The Norman portion is remarkably well executed: it has a groined chancel, three fine doorways, and a handsome west end. The churches of Hanborough, Swinbrook, and Great Tew, and Whiteford Chapel near Burford, have early Norman portions. The more antient buildings of the colleges at Oxford have been noticed. Of monastic remains there are but few, and those not striking. Of Osney Abbey, once so magnificent, and of Godstow Nunnery, near Oxford, the ruins are small; those of Godstow consist of ranges of wall on the north, south, and east sides of an extensive area, and a small building at one angle. Godstow has some historical interest, from its being the scene of the early life of Rosamond, daughter of Lord Clifford, the 'fair Rosamond' of Henry II., and the place of her interment. The story of her being poisoned by the jealous Eleanor, Henry's queen, is a popular fiction. Henry placed Rosamond during the continuance of their amour in a house, or, as it was anciently termed, 'a bower,' which he had at Woodstock. It seems however that their intercourse was broken off on Henry's marriage, and Rosamond retired to Godstow, where she lived in penitence and seclusion till her death. She was buried at first before the high altar; but her remains were afterwards removed out of the church into the chapter-house, which is probably the building at the angle of the enclosure yet remaining. At the Reformation her bones were taken up and the tomb destroyed. Leland, who mentions this fact, says that her bones were closed in leather, and outside that with lead; and that when these were opened, 'a sweet smell came out.' Of an antient hospital at Banbury there are some remains, now converted into a barn; part of the priory of Cogges, near Witney, is now converted into a farm-house; of Bruern Abbey and Goring Nunnery there are some slight remains; and the fragments of Thame Abbey, which are considerable, are connected with the modern mansion erected on their site. Part of the shell of a small alien priory at Minster Lovel is yet standing.

In the civil war of Charles I. this county was the scene of several severe actions. Oxford was seized by Sir John Byron, a royalist, at the beginning of the contest: he however was driven from it by Lord Say, then lieutenant of the county; but the king recovered it after the battle of Edge-hill, A.D. 1642. He also took Banbury and Broughton castles, the former with a strong garrison. At Oxford, Charles assembled those members of the two houses who adhered to him, and formed them into a parliament of his own, which met in the great hall of Christ Church College. Here the commissioners of the parliament waited on the king (A.D. 1643) with proposals of peace, but these negotiations were soon broken off. In the same year a severe skirmish took place at Caversham Bridge between a body of the parliamentary army, then besieging Reading, and a body of the king's troops, under Prince Rupert and General Ruthven, who attempted to relieve the town; and about two months after occurred the skirmish of Chalgrove Field, near Watlington. Prince Rupert had beaten up the quarters of the parliamentary army near Thame, and was returning to Oxford with many prisoners, when he was overtaken by the parliamentarians, whom he repulsed. It was in this skirmish that Hampden was mortally wounded: he died at Thame three weeks after. In the summer of 1644, Waller and the parliamentary armies of Essex besieged Oxford, but retired from the city on learning that the king had left it. An indecisive skirmish was fought soon after at Cropredy, near Banbury, between the king's army and that of Waller. Banbury Castle was subsequently besieged by a body of parliamentarians under Colonel Fiennes, but the siege was raised on the approach of a royalist detachment under the earl of Northampton. In April, 1645, Cromwell beat a body of royalist cavalry at Islip Bridge, between Oxford and Bicester, and obliged Colonel Windebank, who occupied Bletchingdon House with a garrison of two hundred men, to surrender. Oxford was soon after besieged by Fairfax; but the siege was raised, in consequence of the king's attack upon Leicester; and the king, after his defeat at Naseby, found shelter in this city all the winter. In 1646 the parliamentarians took Woodstock manor-house and Banbury Castle by capitulation; and the garrison of Oxford, which was again besieged by Fairfax, surrendered by order of the king, who had given himself up into the hands of his enemies. No political event of interest has occurred since, except the occupation of the city of Oxford by a regiment of dragoons in the rebellion of 1715.

(*Beauties of England and Wales*; Dunkin's *Oxfordshire*; Phillips and Conybeare's *Outlines of the Geology of England and Wales*; Priestley's *History of Navigable Rivers and Canals*; Rickman's *Gothic Architecture*; Palgrave's *Rise and Progress of the English Commonwealth*; Reynolds's *Iter Britanniarum*; *Parliamentary Papers*.)

STATISTICS.

Population.—Oxfordshire is chiefly an agricultural county, it being the eleventh in the list of agricultural counties. Of 39,023 male inhabitants twenty years of age and upwards, 19,500 are engaged in agricultural pursuits, while only 711 are employed in manufactures or in making manufacturing machinery. Of these latter, 290 men were employed, in 1831, at Witney, in making blankets; 60 at Hailey, and 11 at Crawley. In Banbury and its vicinity, 125 men were employed in plush and girth making, and 40 at West Shefford, Bourton, and Wardington. There were some few weavers at Bloxham, Adderbury, and elsewhere. Glove-making gives employment to some of the population in the vicinity of Woodstock. Many females are occupied in this work; and about 57 men are noticed as being thus employed. Horse-clothing is made at Chipping-Norton, and a small number of men are employed in some few other manufactures.

The population of Oxfordshire, at each of the four following periods, was:—

	Males.	Females.	Total.	Increase per cent.
1801	53,786	55,834	109,620	..
1811	59,132	60,059	119,191	8·73
1821	68,817	68,154	136,971	14·91
1831	75,957	75,769	151,726	10·77

shewing an increase between the first and last periods of 42,106, or about 38½ per cent. on the whole population, being 19½ per cent. below the whole rate of increase throughout England.

The following table exhibits a summary of the population, &c., of every hundred, as taken in 1831.

HUNDREDS, CITY, AND LIBERTY.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males, twenty years of age.
Bampton . .	2,905	3,124	41	110	1,485	1,106	533	7,373	7,337	14,710	3,735
Banbury . . .	2,314	2,505	17	96	865	1,048	592	5,674	5,775	11,449	2,820
Binfield . . .	1,709	1,681	9	48	620	532	729	4,168	4,439	8,607	2,091
Bloxham . . .	1,873	1,988	3	49	1,160	517	311	4,340	4,369	8,706	2,210
Bullington . .	2,493	2,747	11	86	1,485	503	759	6,407	6,450	12,857	3,187
Chadlington . .	2,984	3,194	12	82	1,931	762	501	7,730	7,246	14,976	3,697
Dorchester . .	599	704	1	16	454	144	106	1,639	1,618	3,257	822
Ewelme . . .	1,174	1,345	3	14	832	288	225	3,212	3,013	6,225	1,553
Langtree . .	781	841	11	7	583	139	119	2,087	1,990	4,077	1,049
Lewknor . . .	957	1,056	6	26	683	245	128	2,547	2,549	5,096	1,261
Pirton . . .	631	325	5	12	247	48	30	1,623	1,696	3,319	849
Ploughley . .	2,760	2,968	1	46	1,916	791	261	7,031	7,019	14,050	3,674
Thame . . .	918	999	4	26	561	296	142	2,328	2,409	4,734	1,137
Wootton . . .	3,545	3,860	15	93	2,394	930	536	8,965	8,942	17,907	4,561
Oxford (City) . .	3,426	3,901	51	111	58	1,843	2,000	10,551	10,098	20,649	5,791
Oxford (Liberty) .	265	332	..	27	30	262	40	712	825	1,537	386
Totals .	29,334	31,770	197	849	15,304	9,454	7,012	76,387	75,769	152,156	39,023

County Expenses, Crime, &c.—The sums expended for the relief of the poor, at the four dates of—

		£.		s.	d.	
1801	were	88,689,	being	16	2	for each inhabitant.
1811	. .	143,108	„	24	0	„
1821	. .	115,646	„	16	10	„
1831	. .	130,043	„	17	1	„

The sum expended for the same purpose for the year ending March, 1838, was 64,314*l.*; and assuming that the population had increased from 1831 to 1838 in the same rate of progression as in the ten years preceding 1831, the above sum gives an average of about *7s.* 11*d.* for each inhabitant. These averages are above those for the whole of England and Wales.

The sum raised in this county for poor-rate, county-rate, and other local purposes, in the year ending 25th March, 1833, was 158,630*l.*, and was levied upon the various descriptions of property as follows:—

On land . .	£128,375	9*s.*
Dwelling-houses .	26,964	0
Mills, factories, &c. .	1,462	5
Manorial profits, navigation, &c.	1,848	9
Total	£158,630	3

The amount expended was—

For the relief of the poor . .	£130,607	7*s.*
In suits of law, removal of paupers, &c.	4,278	10
For other purposes . .	23,698	19
Total money expended	£158,584	16

In the Returns made up for subsequent years, the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 150,335*l.* 6*s.*, 129,482*l.* 5*s.*, 95,547*l.* 10*s.*, (not stated for 1837), and 78,742*l.* respectively; and the expenditure of each year was as follows:—

	1834.	1835.	1836.	1837.	1838.
	£	£	£	£	£
For the relief of the poor	129,615	106,640	77,322	66,483	64,314
In suits of law, removal of paupers &c. .	4,441	2,150	1,823	1,134	1,102
Payments towards the county rate . .	15,392	8,491	9,145	not given	7,996
For all other purposes		11,695	7,167	4,795	7,026
Total money expended	£149,448	128,976	95,457		80,438

The saving effected in the sum expended in 1838, as compared with that expended in 1834, was therefore 69,010*l.* 11*s.*, or about 46 per cent.; and the sum expended for the relief of the poor in 1838 was less than that in 1834 by 56,301*l.*, or about 46½ per cent.

The number of turnpike trusts in Oxfordshire, as ascertained in 1836, under the Acts 3 and 4 Wm. IV., c. 80, was 21; the number of miles of road under their charge was 342. The annual income arising from tolls and parish compositions in lieu of statute duty in 1836 was 24,784*l.* 4*s.* and the annual expenditure in the same year was as follows:—

	£.	s.	d.
Manual labour . . .	9,975	7	0
Team labour and carriage of materials	638	2	0
Materials for surface repairs .	2,114	1	0
Land purchased . . .	38	0	0
Damages done in obtaining materials	308	12	0
Tradesmen's bills . .	1,006	17	0
Salaries of treasurer, clerk, and surveyor	1,123	0	0
Law charges . . .	1,293	3	0
Interest of debt . . .	5,230	16	0
Improvements . . .	1,576	5	0
Debts paid off . . .	773	8	0
Incidental expenses . .	596	8	0
Estimated value of statute duty performed . . .	151	16	0
Total expenditure	£24,835	15	0

The county expenditure in 1834, exclusive of that for the relief of the poor, was 8775*l.*, disbursed as follows:—

	£.	s.	d.
Bridges, building, repairs, &c.	933	15	0
Gaols, houses of correction, &c., and maintaining prisoners, &c. .	3,091	5	0
Shire-halls and courts of justice, building, repairing, &c. . .	29	15	0
Prosecutions . . .	1,804	19	0
Clerk of the peace . .	691	1	0
Conveyance of prisoners before trial	491	1	0
Conveyance of transports .	128	2	0
Vagrants, apprehending and conveying	191	2	0
Constables, high and special .	1,006	13	0
Coroner . . .	177	12	0
Miscellaneous . . .	229	15	0
Total expenditure	£8,775	0	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 746, 942, and 1425 respectively, making an average of 106 annually in the first period, of 134 in the second period, and of 203 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 87, 60, and 65 respectively. Among the persons charged with offences there were committed for—

	1831.	1832.	1833.
Felonies . .	65	50	59
Misdemeanors .	22	10	6

The total number of committals in each of the same years was 168, 101, and 124 respectively.

	[illegible]	[illegible]	[illegible]
The number convicted was	117	87	71
The number acquitted was	36	14	29
Discharged by proclamation	15	[illegible]	24

There were 277 persons charged with crimes at the assizes and sessions in Oxfordshire in 1836. Of these 25 were charged with offences against the person, 15 of which were common assaults; 10 were charged with offences against property committed with violence; 222 with offences against property committed without violence; 3 for malicious offences against property; 3 for forging and uttering counterfeit coin; and 14 for various misdemeanors.

Of the whole number committed, 192 were convicted, 56 were acquitted, 4 were not prosecuted, and no bill was found against 25. Of those convicted, 2 were sentenced to transportation for life, and 47 for various other periods; 2 were sentenced to imprisonment for two years or above one year; 24 for one year or above six months; and 117 for six months or under; [illegible] were fined. Of the whole number of offenders, 243 were males and 34 females; 98 could neither read nor write; 148 could read and write imperfectly; 22 could read and write well; the degree of instruction of the remaining 19 could not be ascertained.

The number of persons registered in 1837 to vote for county members was 5249. Of these, 3793 were freeholders, 131 leaseholders, 208 copyholders, and 1117 occupying tenants: being 1 in 29 of the whole population, and 1 in 7 of the male population twenty years of age and upwards, as taken in 1831.

Oxfordshire contains five savings' banks: the number of depositors and amount of deposits on the 20th of November, in each of the following years, were as under:—

	[illegible]	[illegible]	[illegible]	[illegible]
Number of depositors	[illegible]	[illegible]	[illegible]	[illegible]
Amount of deposits	[illegible]	[illegible]	[illegible]	[illegible]

The various sums placed in the savings' banks in 1836, 1837, and 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" 50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" 100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" 150	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
" 200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Above 200	18	4,240	16	[illegible]	16	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Education.—The following summary is taken from the Parliamentary Returns on Education made in the session of 1835:—

	Schools.	Scholars.	Total.
Infant schools	68		
Number of children at such schools; ages from 2 to 7 years:—			
Males		335	
Females		374	
Sex not specified		602	
			1,311
Daily schools	510		
Number of children at such schools; ages from 4 to 14 years:—			
Males		6,450	
Females		5,730	
Sex not specified		2,378	
			14,558
Schools	578		
Total of children under daily instruction			15,869
Sunday schools	384		
Number of children at such schools; ages from 4 to 15 years:—			
Males		6,800	
Females		7,161	
Sex not specified		2,771	
			16,732

Assuming that the population between the ages of 2 and 15 years has increased in the same proportion as the whole of the population since 1821, and that the whole population has increased in the same ratio since 1831 as in the ten years preceding that time, the approximate number of children between the ages of 2 and 15 years thus found residing in Oxfordshire, in 1833, was about 51,732. Twenty-three Sunday-schools are returned from places where no other school exists, and the children, 765 in number, who are instructed therein cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number or in what proportion duplicate entry is thus produced, must remain uncertain. Fifty-five schools, containing 3347 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created. Making allowance for this uncertainty therefore, we may perhaps fairly estimate that little more than one-half of the children between the ages of 2 and 15 years are under instruction in this county.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscription and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	1	[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Daily Schools	71	[illegible]	[illegible]	[illegible]	361	[illegible]	[illegible]	[illegible]
Sunday Schools	10	[illegible]	236	14,455	—	—	[illegible]	[illegible]
Total	82	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The schools established by Dissenters, included in the above statement, are—

		Scholars.
Infant-schools	1, containing	76
Daily-schools	11	561
Sunday-schools	57	3,823

The schools established since 1818 are—

Infant and other daily schools	264, containing	9,280
Sunday-schools	166	11,595

Thirty-nine boarding-schools are included in the number of daily-schools given above. No school in this county appears to be confined to the children of parents of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by Dissenters, with whom are here included Wesleyan Methodists and Roman Catholics.

Lending-libraries of books are attached to 25 schools in this county.

OXPECKERS. [Buphaga; Onyhovys.]

OXUS is the antient name of the river Amoo or Jihon. This river rises in the mountains which form the northern boundary of India, and flows into the Sea of Aral. According to most of the antient writers, it flowed direct into the Caspian; and this statement is said to be confirmed by the existence of its former channel. Herodotus speaks of this river under the name of Araxes (i. 201, 202, 205; iv. 11, 40); though it must be remarked that many commentators suppose that the Araxes of Herodotus is the river of the same name in Armenia; while others suppose that it is either the Volga or the Jaxartes. It appears almost certain however that this Araxes should be looked for in the east of the Caspian, though it would be difficult to determine whether it should be regarded as the same as the Oxus or the Jaxartes. Herodotus appears to have confounded it with the Araxes of Armenia, since he says that it rises in the country of the Matieni (i. 202) and flows towards the east (iv. 40). According to his account there were many islands in it, some as large as Lesbos, and it emptied itself by forty mouths, which were all lost in marshes, with the exception of one, which flowed into the Caspian (i. 202). Strabo says that the Oxus rose in the Indian mountains and flowed into the Caspian (Strabo, xi., p. 509, 519); which is also the opinion of Mela (iii. 5) and Ptolemy. Pliny (vi. 18) makes it rise in a lake called Oxus; but it is not improbable that, with his usual carelessness in matters relating to geography, he confounded its source with its termination.

The Oxus is a broad and rapid river, and receives many affluents, of which the most important mentioned by the antients was the Ochus, which, according to most accounts, flowed into the Oxus near its mouth; though, according to some, it flowed into the Caspian by a separate channel. (Strabo, xi. 509, 518.) There is however considerable difficulty in the statements of the antient writers on this subject. Strabo states that it rises in the same mountains as the Oxus (xi. 509); which must be a mistake, unless, as is probably the case, the Oxus and the Ochus are to be regarded as the same river.

The Oxus has exercised an important influence upon the history and civilization of Asia. It has in almost all ages formed the boundary between the great monarchies of south-western Asia and the wandering hordes of Scythia and Tartary. The conquests of Cyrus were terminated by its banks, and those of the Macedonians were few and unimportant beyond it. The Oxus appears to have formed one of the earliest channels for the conveyance of the produce of India to the western countries of Asia. Strabo informs us (xi., p. 509), on the authority of Aristobulus, that goods were conveyed from India down the Oxus to the Caspian, and were thence carried by the river Cyrus into Albania and the countries bordering on the Euxine. This account is also confirmed by the statement of Varro (quoted by Plin., vi. 19), who informs us that Pompey learned, in the war with Mithridates, that Indian goods were carried by the Oxus into the Caspian, and thence through the Caspian to the river Cyrus, from which river they were conveyed by a journey of five days to the river Phasis in Pontus.

The breadth of the Oxus immediately to the north of Balkh is 800 yards, and its depth 20 feet (Burnes's *Travels into Bokhara*, vol. i., p. 249); but south of Bokhara the river is only 650 yards wide, but from 25 to 29 feet deep. (Burnes, vol. ii., p. 5.)

OXYGEN, an elementary body, the properties of which are best known and most remarkable in its elastic or aëriform state, in which it is termed *Oxygen gas*. The most important discovery of this substance was made by Dr. Priestley on the 1st of August, 1774, and of his numerous contributions to chemical science, this is at once the most splendid and the most solid, and has rendered his name imperishable.

Dr. Priestley has stated, with his usual candour, that the discovery was also made, quite independently, though later, by Scheele, and he has refuted the unjust claim of Lavoisier to be also one of the discoverers of this element. To this gas Dr. Priestley gave the name of *dephlogisticated air*, Scheele called it *empyreal air*, and Condorcet *vital air*. Lavoisier gave it the name of *oxygen*, from the Greek words ὀξὺς, *acid*, and the root γεν, to *generate*, because he considered it as the sole cause of acidity; this appellation it still retains, although it is now well known that there are acids which do not contain it and alkalis which do.

Dr. Priestley first procured this gaseous body by heating the binoxide of mercury, then called *mercurius præcipitatus per se*, in an air-jar, over mercury, by means of a lens, and he afterwards obtained it from other substances.

It is now prepared in various ways, according to the purposes to which it is intended to be applied. These ways we shall briefly state and explain, and also describe the production of the gas from the binoxide of mercury, first used by Dr. Priestley.

When mercury is heated, and at the same time exposed to atmospheric air, it is found that the volume of the air is diminished, and the weight of the mercury increased, and that it becomes during the operation a red crystalline body, which is the binoxide of mercury, formed by the metal combining with the oxygen of the air.

When this substance is subjected in a retort to a higher temperature than that required for its formation, the affinity between the metal and the oxygen is overcome; the former returns to its metallic state, and the latter to its gaseous form; and if added to the residual atmospheric air, its volume is restored.

If it be quite pure, and the operation be accurately performed, 218 grains (1 equivalent) of binoxide of mercury should be separated by the agency of heat into 202 grains, one equivalent of mercury, and 16 grains, two equivalents of oxygen, measuring 46·5 cubic inches.

By this process then oxygen gas is, though indirectly, obtained from atmospheric air: but there is a natural metallic oxide, the *binoxide of manganese*, which is found plentifully, and which also yields it by the mere application of heat, and the quantity of gas obtained is dependent upon the degree of heat employed; in this case however, unlike that of the binoxide of mercury, the metal is not reduced. The equivalent of binoxide of manganese [MANGANESE] is 44, consisting of 28 of metal and 2 equivalents of oxygen = 16; and when 44 grains are heated to moderate redness in a coated glass retort, half an equivalent of oxygen, or 4 grains, measuring 11·62 cubic inches, are expelled, and there remains in the retort an equivalent of sesquioxide of manganese, composed of 28 metal and 12 oxygen = 40. But if the equivalent of binoxide be strongly heated in an iron retort, it is then converted into red oxide, consisting of one equivalent of metal, and one and one-third of oxygen, while two-thirds of an equivalent of oxygen are expelled, weighing 5·32 grains and measuring 15·5 cubic inches.

Another but less eligible method of obtaining oxygen from the binoxide of manganese, is to heat it with sulphuric acid in a retort; in this case an equivalent of the binoxide =44, loses a whole equivalent of oxygen = 8 grains, or 23·25 cubic inches, and there remain in the retort protoxide of manganese combined with the sulphuric acid, forming protosulphate of manganese. It is to be observed that these statements of the quantities of oxygen procurable from a given quantity of the binoxide of manganese are made on the supposition of its being quite pure, which is hardly ever the case; the binoxide of commerce very commonly contains 20 per cent. of impurity.

Red or deutoxide of lead also, when heated, either with or without sulphuric acid, yields oxygen gas, but the quantity obtained is small, and the processes are on several accounts ineligible. When nitrate of potash also is heated to redness, it gives out a considerable quantity of oxygen gas, from the decomposition of the nitric acid; but as it comes over mixed at different periods of the operation with variable quantities of the azotic gas of the nitric acid, this is not a method usually resorted to.

The oxygen gas obtained from binoxide of manganese is sufficiently pure for all the usual purposes of experiments intended merely to illustrate the properties of the gas; but when the gas is required for chemical analysis or accurate investigations, it is then obtained from the salt formerly called oxymuriate of potash, but now chlorate of potash.

Chlorate of potash is composed of one equivalent of chloric acid 76, and one of potash 48 = 124; and when 124 grains are heated in a retort, they are resolved into an equivalent of chloride of potassium 76, which remains in the retort, and 6 equivalents of oxygen, 5 from the acid and 1 from the potash = 48, which measure nearly 140 cubic inches, so that there is scarcely any other substance which yields so much oxygen gas or of so great purity.

Oxygen possesses great power of combination with other elementary bodies, there being scarcely one with which it is not known to combine either by direct union or indirect chemical action. The compounds to which it gives rise by combining, for example, with certain metals, and also indeed with some other bodies, may be classed under the three heads of oxides, acids, and alkalis. There are many bodies which, by a moderate degree of oxidation, become first oxides, and by an increased degree, acids; such substances are charcoal, phosphorus, chromium, &c.: but there is no instance of its forming with different proportions of the same element an acid and an alkali.

The properties of oxygen gas are, that it is devoid of colour, taste, or smell, and being transparent, it is also invisible. It possesses the mechanical properties of common air; it is capable of being respired, and a given volume of it will support life much longer than an equal bulk of common air; on this account the name of vital air was bestowed upon it. It is heavier than atmospheric air, 100 cubic inches at a medium temperature and pressure weighing 34·4 grains, whereas an equal volume of atmospheric air weighs 31 grains. It is but slightly soluble in water, requiring about 27 times its bulk for solution. Light has no effect upon this gas; by heat, like all gaseous bodies, it is merely expanded; and electricity is incapable of effecting any change in its properties. Oxygen gas has not been rendered either liquid or solid by the united agency of cold and pressure, and not having been divided into two or more kinds of matter, it is considered as elementary in its nature. Its equivalent, atomic or combining weight, is 8.

It will be proper here to notice the production of oxygen gas by the action of electricity, especially voltaic electricity, which, as is well known, possesses the power of evolving both oxygen and hydrogen from water. Oxygen gas is also evolved by the action of the sun's rays on the moistened leaves of trees, which by this agency decompose the carbonic acid diffused in the atmosphere from various sources, and by combining it with their carbon, flourish and increase in size. When compounds containing oxygen are decomposed by voltaic electricity, the oxygen is evolved in the gaseous state at the anode or positive pole.

The most remarkable property of oxygen gas, and that on account of which it has been called *fire-air*, is the facility and splendour with which bodies, when previously ignited, burn in it. Substances which do not undergo combustion in the air, will readily do so, and with great brilliancy, in oxygen gas; iron for example burns very readily in it when previously made red-hot. The intensity of the light emitted by burning phosphorus in oxygen gas is such as to be scarcely tolerable.

In conclusion, we may remark, that until after the discovery of this gas nothing was or could be known respecting the nature of the air, of water, or of earth, all of which, formerly reckoned as elementary bodies, are now known to be compound, and to contain oxygen as one of their constituents. It has also thrown great and unexpected light on the nature of combustion and respiration.

The compounds which oxygen forms with metals and other elementary bodies, are treated of under their respective heads, whether they are oxides, acids, or alkalis.

OXYLOPHUS. [CUCULIDÆ, vol. viii., p. 209.]

OXYMURIATIC ACID. [CHLORINE.]

OXYNOTUS, Mr. Swainson's name for a genus of *Ceblepyrinæ*, or *Caterpillar-Catchers*. [SHRIKES.]

OXYRHYNCHS, a name given by M. Latreille to a great division of Brachyurous crustaceans, consisting of the *Notopodes*, the *Oxystomes*, and many of the *Anomoures* (Anomourous) of M. Milne Edwards. The latter zoologist however remarks that as the classification in which the term was employed has been long abandoned even by its author, he (M. Milne Edwards) had thought that it would not be inconvenient to apply it to the family about to be noticed, and so avoid the necessity of adding a new name to zoological nomenclature, which is already so vast.

The natural group, then, to which M. Milne Edwards applies the name '*Oxyrhinques*' is that which presents a nervous system more centralised than he has as yet discovered among the crustaceans, and it is principally for that reason that he places the Oxyrhynchs at the head of the series formed by these animals. In fact, he observes, the different medullary ganglions of the thorax do not, in this instance, form more than a single solid mass in the form of a disk, whilst in the other Decapods, of which the internal anatomy is known, these same ganglions remain more or less distinct, and only unite so as to form a circular ring. In many of the Oxyrhynchs, M. Milne Edwards has also remarked that the two portions of the *liver*, instead of being completely separated as in the other Decapods, are united on the median line by an unequal lobe: this viscus is well developed and extends over a great part of the vault of the branchial cavity. The number of *branchiæ* is always nine on each side of the thorax; seven of these organs, the last of which is inserted above the third foot, are very much developed, and rest on the vault of the sides, whilst the two others are often reduced to the rudimentary state, and are hidden at the base of the first. Lastly, the vault of the *respiratory cavity* is but slightly elevated, and, throughout its extent, nearly comes in contact with the upper surface of the branchiæ. The rest of the internal organization offers nothing peculiar.

But the same assertion cannot be made with regard to the external organization of these animals. The general form of their body approximates to that of a triangle, of which the base is rounded and turned backwards. The *carapace* is nearly always very unequal, rough with spines or hairs, and remarkably longer than it is wide; the regions, with the exception of the hepatic, are ordinarily distinct; the stomachal region is nearly always longer than it is wide, although it occupies all the width of the post-orbital part of the carapace, and is never divided into two on the median line by a nearly linear prolongation of the genital region, as is seen in the greater number of the *Cyclometopes* and the *Catometopes*. The last-named region is, in general, but little developed, and is confounded more or less completely with the stomachal region, or is truncated anteriorly. The hepatic regions are rudimentary and indistinct, but the branchial regions are very much developed, and extend beyond the edge of the anterior border of the sternal plastron; they are convex, and it is always towards their middle that the carapace presents the greatest width. Nothing particular is observable in the cardial and intestinal regions. The *front* is always narrow, and, in general, advanced so as to constitute a very projecting *rostrum*. The *orbits* are directed more or less obliquely outwards, and are often so small and so little in proportion to the length of the ocular stems, that those organs cannot bend back; the post-foraminal portion of these cavities is rather deep, and extends, as usual, rather far outwards, that the eyes may be entirely hidden therein. The *antennæ* of the first pair exhibit nothing remarkable in form; but their moveable stem is fairly developed; they bend back, nearly always, longitudinally, and are lodged in receptacles equally longitudinal and completely separated from the *orbital cavities*. In nearly all the *Brachyura* the first joint of the external antennæ is extremely developed, and completely soldered to the front and to the neighbouring parts of the pterygostomian regions; it constitutes a considerable portion of the lower wall of the orbit, and presents at its base a circular aperture, which is filled by a calcareous disk belonging to the auditory apparatus; the two succeeding joints are, in general, perfectly free, and support a rather long terminal stem. The *epistome* is, in general, nearly square; the *antennary region* very much developed, and the edge of the *buccal frame*, which terminates it posteriorly, is nearly straight and projects much. The *pterygostomian regions*, on the contrary, are not extended, and are in general rather clearly divided into two portions, one corresponding with the efferent canal of the respiratory cavity, and the other situated in front of and outside the first; finally, the curved line which indicates the point of junction of the dorsal piece of the carapace with the lateral flaws, terminates towards the base of the third foot. The *external jaw-feet* never reach beyond the anterior border of the buccal frame; their first joint is large, and serves as a valvule to close the aperture which is seen immediately before the anterior feet, and conducts to the branchial cavity; it supports at its internal extremity a palp and a stem, of which the two first joints are very large and cover the rest of the buccal apparatus, of which the three last pieces are by much the least: the general form of this species of opercula varies, but is never triangular. The *jaw-feet* of the second pair present nothing remarkable; the first joint of the palp of those of the third is always longer than the corneous blade, which represents the external portion of the stem. The other appendages of the mouth offer nothing particular. In general, the *sternal plastron* is nearly circular, and the space which separates the posterior feet inconsiderable. The median *apodeme* of the thorax ordinarily only occupies the last ring: the sella Turcica is not much elevated, and the sternal *apodemes*, which separate the corresponding cells from the external jaw-feet and the thoracic three first pair, are far from extending near to the median line of the body. The first pair of *feet* are generally of the same size on each side; but their dimensions are very different in some species and also in the sexes. The succeeding feet are often of enormous length, and are nearly always slender and cylindrical; this disposition is even carried so far in some of the Oxyrhynchs that it has obtained for them the name of *Sea-spiders*. The second or third last pairs are sometimes subcheliform; but these organs never take the form of natatory fins, and in general those of the three last pairs diminish gradually in length.

It is in the basilary joint of the posterior feet that the apertures which give a passage to the intromissive organs of the male are situated: these organs are in immediate relationship with the abdominal members, and are never lodged in a transversal canal of the sternum. The disposition of the *abdomen* varies much; sometimes it presents seven distinct pieces; sometimes that of the female only offers six, five, or even four; whilst that of the males remains composed of seven separate rings; sometimes the males have only six segments. It is also worthy of note that in the males the space comprised between the posterior feet is entirely covered by the abdomen. With regard to the appendages of this part of the body, they present nothing particular in the female, and in the male those of the first pair are in general slender, styliform, truncated at the end, nearly straight, and rather long; whilst those of the second pair are rudimentary.

Habits, Food, &c.—The Oxyrhynchs are all essentially marine. None are known to live in fresh-water or to frequent the shores of the sea; but all inhabit great depths, and are generally obtained when dredging for large fish. Their long feet would convey an idea of nimbleness, but these crustacea are in general slow in their motions, and soon die out of water. No swimmers are known among them.

⁂ No fossil Oxyrhynchs have as yet been detected.

(M. Edwards.) M. Milne Edwards divides this family, which embraces a considerable number of genera, into three tribes—the *Macropodians*, the *Maians* or *Maiadæ*, and the *Parthenopians*. The reader will find the two first treated of in this work under their respective titles, and the *Parthenopians* will be described under that name.

OXYRHYNCHUS, M. Temminck's name for a genus of birds placed by Mr. Swainson under the family *Picidæ*. [Woodpeckers.]

OXYRHYNCHUS. [Egypt.]

OXY'STOMA. The *Oxystomes* of M. de Blainville form the fifth family of his *Asiphonobranchiata*. [Janthina.]

OXYSTOMES, the name applied by M. Milne Edwards to the fourth and last family of Brachyurous crustaceans (type, *Leucosia*, Fabr.), comprising all the crustacea which most resemble the type in their general organization, and especially in the conformation of the buccal apparatus.

The apertures for the passage of the intromissive organs of the males are hollowed out in the basilary joint of the posterior feet, as in the Oxyrhynchs and the Cyclometopes. The disposition of the branchiæ is also nearly the same as in the last-named group, but sometimes the number of these organs is less considerable, and does not amount to more than six on each side. In most of these crustaceans the branchial cavity does not present at the base of the feet any aperture for the entrance of the water necessary for respiration, and this liquid only arrives there by a gutter hollowed out on each side of the prelabial space, serving as a passage for the water expelled from the branchial cavity. This canal is very long in nearly all the Oxystomes, and is converted into a species of tube by a prolongation of the anterior jaw-feet. The internal soft parts have not as yet been discovered to present any particular organization.

The *Carapace* is generally more or less circular, but sometimes it is curved anteriorly only, and much resembles that of some of the Cyclometopes. The *eyes* are ordinarily small. The disposition of the *antennæ* varies, but in most cases the region occupied by these appendages is of small extent. The *buccal frame* is in most of the family entirely triangular, and terminates anteriorly by a narrow summit, which is much prolonged, often to a level with the eyes and close to the front. The external *jaw-feet* which fill this have also ordinarily the form of an elongated triangle, and do not permit the terminal stemlet to be perceived externally; they advance then near to the extremity of the buccal frame, but never reach it, so that there is always at this point a gaping aperture which serves for the passage of the water necessary for respiration; in other cases the external jaw-feet are much shorter than the buccal frame; the lamellar appendage of the *internal jaw-feet* much exceeds it, and their third joint, which is narrow and more or less tapered anteriorly, does not cover the three small terminal joints. The *anterior feet* are nearly always short, and in the greater part of the family the hand is compressed, more or less elevated above in the form of a crest, and disposed so as to be capable of exact application against the buccal frame. M. Milne Edwards divides the family into the following tribes—the *Leucosians*, the *Calappians*, the *Corystians*, and the *Dorippians*.

Leucosians. (M. Edwards.)

Carapace, in general circular, presenting anteriorly a rather strong projection, at the extremity of which is often found the front and the orbits. *Front* narrow, and orbital cavities very small and nearly circular. The *internal antennæ* bend back nearly always transversely or very obliquely under the front; and the *external antennæ*, which are inserted in a narrow but deep notch of the orbitary internal angle, are nearly rudimentary. The *buccal frame* is in general regularly triangular, and the external *jaw-feet* of the same form do not show uncovered the stemlet which supports their third joint; the palp or lateral branch of these organs is very large, and their base is separated from that of the anterior feet by a prolongation of the pterygostomian region, which is soldered into the sternal plastron. The result is that the aperture situated ordinarily at this point, and serving for the entrance of the water into the respiratory cavity, is here wanting, and that liquid only arrives at the branchiæ by means of two canals hollowed on each side of the prelabial space and parallel to the efferent canals of the respiratory cavity. The second pair of jaw-feet present nothing remarkable; but the first pair have the terminal joint of their stem lamellar, and sufficiently long to arrive at the anterior extremity of the buccal frame.

The *sternal plastron* is nearly circular, and the legs are slender. The number of abdominal joints is three or four. (M. E.)

M. Milne Edwards arranges the following genera under this tribe—*Arcania*, *Philyra*, *Myra*, *Ilia Guaia*, *Leucosia*, *Persephona*, *Nursia*, *Ebalia*, *Oreophorus*, *Iphis*, and *Ixa*. We shall endeavour to illustrate two of these genera in a subsequent part of the work.

Calappians.

Carapace sometimes circular, sometimes very much widened, and always more or less convex. *Front* of moderate width, and the lateral borders of the carapace delicate and more or less dentilated. *External antennæ* small, but very distinct. External or first pair of *feet* strong, compressed, curved so as to apply themselves against the buccal region, and armed above with a more or less elevated crest. The apertures by which the water arrives in the respiratory cavities are disposed in the ordinary manner in front of the base of the anterior feet, and the number of branchiæ is normal.

The genera arranged by M. Milne Edwards under this tribe are, *Calappa*, *Platymera*, *Mursia*, *Orythia*, *Matuta*, and *Hepatus*. *Calappa* and *Hepatus* have already been illustrated in this work.

Corystians.

M. Milne Edwards is of opinion that the crustaceans which compose this group establish the passage between the Cancerians and the Calappians on one side, and the Anurous Decapods (*Decapodes Anoures*) on the other. The *buccal frame* is not so narrow anteriorly as it is in the greater part of the *Oxystomes*, and the *jaw-feet* do not close it exactly. The *external antennæ* are very large, and the *sternal plastron* is very narrow.

The following genera come under this tribe in the system of M. Milne Edwards: *Atelycyclus*, *Thia*, *Polydectus*, *Corystes*, *Nautilocorystes*, and *Pseudocorystes*. Of these genera, *Corystes* has already been described and illustrated in this work.

Dorippians.

Carapace very much depressed, truncated anteriorly, a little widened behind, nearly quadrilateral, and in general too short to cover the whole body. *Front* wide; eyes of the ordinary size. Disposition of the *mouth* approximating nearly to that in *Calappa*, *Mursia*, &c. The water reaches the branchiæ by two apertures situated in front of the base of the anterior feet. The *sternal plastron* is circular and strongly recurved up towards its posterior part. The *anterior feet* are short; those of the two succeeding pairs are long and terminated by a styliform joint. The last or the two last pair are inserted above the others, upon the back, so to speak, and are nearly always much smaller than the preceding: they are terminated in general by a hooked joint, so disposed as to be capable of acting as a prehensile organ. (M. E.)

M. Milne Edwards arranges the following genera under this tribe: *Dorippe*, *Cymopolia*, *Caphyra*, and *Ethusa*. Of these, *Dorippe* and *Ethusa* have been already described and illustrated in this work.

OXY'STOMUS, Mr. Swainson's name for a genus of birds arranged by him among the typical *Starlings*. [Sturnidæ.]

OXYU'RUS, Mr. Swainson's name for a genus of birds placed by him under the subfamily *Certhianæ*, with the following

Generic Character.—Bill short, straight, very slender, resembling that of a *Sylvia*; the sides compressed and the margin inflexed; the tips entire. Wings rather lengthened; the outer quills graduated, the fourth and fifth equal. Feet large. Middle toe of the same length as the hinder; lateral toes unequal, the outer connected to the middle as far as the first point; inner toe shortest. Tail graduated, rigid: the inner web broad, and abruptly sinuated at the end; outer web very narrow; tips of the shafts hard and naked as in *Dendrocolaptes*.

Locality.—South America. (Sw.)

Examples, *Oxyurus ornatus* and *Oxyurus Australis*. (Lath., 'Syn.')

OYER AND TERMINER. These words in antient law French denote a commission forming a court of criminal judicature, the distinguishing character of which is described by them. The substance of the commission, or writ as it was anciently called, is an authority given by the king to certain persons judicially to *hear and determine* (*oyer et terminer*) certain specified offences. The commissions of oyer and terminer are the most comprehensive of the several commissions which constitute the authority of the judges of assize on the circuits. On these occasions they are usually directed to the lord chancellor, several high officers of state, two judges of the courts of Westminster, the king's counsel, the serjeants-at-law, and the associates; but (excepting on the Northern Circuit, where all the commissioners but one are of the *quorum*) the judges, king's counsel, and serjeants are always of the *quorum*, so that the other commissioners cannot act without the presence of one of them. Justices of oyer and terminer at the assizes have, by the terms of their commissions, jurisdiction to inquire into the truth of all treasons, misprisions of treason, felonies, and misdemeanors committed within the several counties and places which constitute their circuits, and also to *hear and determine* the same on certain days and at certain places to be appointed by themselves. Besides these ordinary courts of oyer and terminer at the assizes, special commissions of oyer and terminer are sometimes issued upon urgent occasions where offences of a dangerous tendency have been committed in particular districts, and where the public peace and security require immediate inquiry and punishment. So also special commissions have been sometimes issued where from particular circumstances the incompetency of the ordinary tribunals would occasion a failure of justice. A remarkable instance of this kind occurred when Mr. Dunning, afterwards Lord Ashburton, was recorder of Bristol and sole criminal judge under the charters of the city. A forgery of Mr. Dunning's name to a bill of exchange having been committed in Bristol, he properly refused to try a case in which he was a party interested, and it was therefore necessary to issue a special commission for the purpose of hearing and determining this single offence. Upon special commissions of oyer and terminer the course of the proceedings is nearly the same as upon ordinary or general commissions.

OYSTER-CATCHER. [SEA-PIE.]

OYSTERS, or OSTRACEANS, a family of monomyarian conchifers. According to Lamarck, the definition of the family is, 'Ligament interior or demi-interior. Shell irregular and foliated, sometimes papyraceous.'

Linnæus defined his genus *Ostrea* as '*Animal* Tethys. *Shell* bivalve, inequivalve, subauriculated. *Hinge* edentulous, with a hollow ovate little excavation and lateral transverse striæ;' and he divided the genus into the following sections:—

* Pectines auriculati, æquilateri.

Under this section come those Pectens which have nearly equilateral auriculations, as *Pecten maximus, Jacobæus, Ziczac, minuta, Pleuronectes, Radula, Pica.*

** Pectines auriculâ alterâ intus ciliato spinosa.

Under which are arranged *Pecten Pallium, nodosus, Pes felis, pellucens, obliterata, sanguinea, varia, Pusio, glabra, opercularis, gibba.*

*** Pectines valvulis altero latere magis gibbis,

consisting of *P.* [illegible], [illegible], *Lima.*

**** Rudes, vulgo Ostreæ dictæ,

comprising *Ostrea Malleus,* [illegible], *Folium, orbicularis,* [illegible], *Perna, Isognomum,* and *Ephippium.*

Lamarck's *Pectinides* consisted of the genera *Pedum, Lima, Plagiostoma, Pecten, Plicatula, Spondylus,* and *Podopsis.*

The Ostraceans of the same author consist of the genera *Gryphæa, Ostrea, Vulsella, Placuna,* and *Anomia.*

Cuvier, under his *Huîtres* (Ostrea, Linn.), arranges *Ostrea, Gryphæa, Pecten, Lima,* and *Pedum*; and he adds, that the following fossil genera—*Dianchora, Plagiostoma,* *Podopsis,* [illegible], and [illegible], might here find a place.

Appertaining to the Oysters, although multivalve, should be, in his opinion, the *Anomia* of Bruguière. He then proceeds to *Placuna*, a genus related to *Anomia*, and makes the Thorny Oysters, *Spondylus*, Linn. (with *Plicatula*, Lamarck), follow. To these succeed *Malleus, Vulsella, Perna,* &c.

The Ostraceans of M. de Blainville consist of *Anomia, Placuna, Harpax, Ostrea,* and *Gryphæa*) and his *Subostraceans*, of the genera [illegible], *Spondylus, Plicatula, Hinnites, Pecten, Pedum,* and *Lima.*

Of these arrangements that of Linnæus, to a certain extent, appears to us as natural as any; and the *Oysters*, properly so called, *Pectens*, and *Limæ*, are treated of in this work under the article PECTINIDÆ. We see no good reason why *Gryphæa* (*Anomia Gryphus*, Linn.) and *Anomia* should not be associated with that family.

OZANAM, JACQUES, was born in the year 1640, at Bouligneux, in the present department of the Ain. His family, though of Jewish extraction, had long been members of the Roman Catholic Church; and his father was possessed of considerable landed property, to which some ecclesiastical patronage was attached. Jacques, being the younger of two sons, was designed for the church, and accordingly began the necessary studies, but less from his own inclination than to comply with the wishes of his father. His biographers describe him as naturally pious, generous, witty, and gallant; but he certainly was too tolerant for a churchman of his day. The theological writings to which his attention was directed gave him little satisfaction. Other subjects of investigation, such as chemistry, mechanics, &c., which seemed to admit of more useful application, attracted his notice, and thenceforward his theological studies were attended to solely from compulsion or a sense of duty. The tutor to whose care he had been confided possessed some slight acquaintance with the mathematics, and from him he may have received some assistance in reading them; but, with this exception, he was self-taught; and although he never attained to any great eminence as a mathematician, he was the author of several useful works, which became extremely popular, and passed through many editions.

The death of his father, which took place about four years after he commenced reading for the church, left him free to follow whatever occupation he chose. He accordingly removed to Lyon, where he began teaching the mathematics gratuitously, regarding it as a degradation to receive payment for his instruction. It is probable that he did not long act under this impression, as his pecuniary means were limited, and his attachment to games of chance frequently led him to the gaming-table.

At the invitation of the chancellor of France, he removed to the French capital, where his amours soon drew so heavily upon his resources, that he determined upon marrying, as the most effectual way of curtailing his expenditure. His wife was without fortune, but possessed of so many excellent qualities, that his greatest affliction was occasioned by her death in 1701. By her he had twelve children. At Paris he had for many years considerable success as a mathematical tutor, though he was patronised much more by foreigners than by his own countrymen. Most of the former were obliged to leave the country upon the breaking out of the war of the Spanish Succession, the same year as that in which his wife died; and from that time, the income he derived from his profession was both small and uncertain. Montucla, speaking of his scientific productions, remarks, 'He promoted the mathematics by his treatise upon lines of the second order; and had he pursued the same branch of research, he would have acquired a more solid reputation than by the publication of his "Course," "Recreations," or "Mathematical Dictionary;" but having to look to the support of himself and family, he wisely consulted the taste of his purchasers rather than his own.' (*Histoire des Mathém.*, ii., p. 168.) When far advanced in years he was admitted an élève of the Academy of Sciences, and died at Paris, of apoplexy, April 3, 1717. The following is a list of his works, in the order of publication:—

1, 'Méthode pour tracer les Cadrans,' 8vo., Paris, 1673-85-1730; 2, 'Géométrie pratique,' 12mo., Paris, 1684-89-1736-64; 3, 'Tables des Sinus, Tangentes, &c.,' 8vo., Paris, 1685-1720-41; 4, 'Traité des Lignes du premier genre,' 8vo., Paris, 1687; 5, 'Usage de l'Instrument universel pour résoudre promptement tous les Problèmes de la Géométrie pratique,' 12mo., Paris, 1688, 1700-36-48-94 (the instrument referred to is the proportional compass); 6, 'Méthode de lever les Plans et les Cartes de Terre et de Mer,' 12mo., Paris, 1693-1750 (the same improved by Audierne, 12mo., Paris, 1782); 7, 'Dictionnaire Mathématique,' 4to., Amst., 1691 (the same translated and abridged by Raphson, 8vo., London, 1702); 8, 'Cours de Mathématique,' 5 vols. 8vo., Paris, 1693, Amst., 1699; 9, 'Récréations mathématiques et physiques,' 4 vols. 8vo., Paris, 1694-1720-25-35-77 (the same improved and augmented by Montucla, 8vo., Paris, 1778-90; the same in English by Dr. Hutton, 8vo., Lond., 1803); 10, 'Traité de la Fortification,' 8vo., Paris, 1694-1720 (the same translated by Desaguliers, 8vo., Oxf., Lond., 1711); 11, 'Trigonométrie,' 12mo., Paris, 1698; 12, 'Méthode facile pour arpenter et mesurer toutes sortes de Superficies, &c.,' 12mo., Paris, 1699-1725-47-58-79; 13, 'Elémens d'Algèbre,' 8vo., Amst., 1702; 14, 'Géographie et Cosmographie,' 8vo., Paris, 1711; 15, 'La Perspective, théorique et pratique,' 8vo., Paris, 1711-20. In the 'Memoirs of the Academy of Sciences' for 1707 there is a paper by him entitled 'Observations sur un Problème de Trigonométrie spherique.' To the 'Journal des Savans' he contributed: 1, 'Proof of the Theorem that neither the sum nor the difference of two fourth powers can be a fourth power,' May, 1680; 2, 'Answer to a Problem proposed by M. Comiers,' Nov., 1681; 3, 'Proof of a Theorem relative to Imaginary Roots,' April, 1683; 4, 'Method of determining the cubic and sursolid roots of a Binomial.' At his death he left a treatise in MS. upon the Diophantine Analysis, which came into the possession of M. Aguesseau. He also published a corrected and augmented edition of Vlacq's 'Trigonometry,' 8vo., Paris, 1720-65.

(*Eloge, par Fontenelle*; *Œuvres diverses*, La Haye, 1728-29, fol. iii., p. [illegible]; *Biographie Universelle*; &c.)

OZARK MOUNTAINS, THE, constitute an extensive mountain region in the United States of America, west of the Mississippi. They occupy more than half the state of Arkansas and a considerable portion of the state of Missouri south of the Missouri river. Their northern extremity forms the elevated shores of the Missouri river between the mouths of the Osage and Gasconade rivers, where the river begins to run eastward: the hilly country also, which extends between the confluence of the Missouri and Mississippi, and along the west side of the latter river to Cape Girardeau, may be considered as the eastern declivity of the northern portion of this mountain region. The mountains extend south-west from the banks of the Missouri to the banks of the Arkansas river, which may be considered as breaking through the region south of the Arkansas river a mountainous country extends as far south as the Red River. It is not known if the elevated tract which runs along the southern banks of the last mentioned river, and in which the numerous rivers of Texas have their origin, is so connected with the Ozark Mountains that it may be considered as a portion of them. But this seems to be the only continuous elevated ground which unites the Ozarks with the Chippewyan or Rocky Mountains.

This mountain region extends, from south-west to north-east, from the Red River to the Missouri, more than 350 miles in length. If the country about the upper branches of White River, which is covered with high hills, is considered as a portion of the Ozarks, their width from west to east cannot fall short of 100 miles. Thus the Ozarks cover a surface of rather more than 36,000 square miles, or more than two thirds of the area of England, between 90° and 97° W. long. and between 34° and 39° N. lat.

The Ozarks, unlike the Apallachian Mountains, do not consist of parallel ridges. It seems that it is only towards the western edge of the mountain region that a continuous ridge occurs.

At the northern extremity, near the mouth of the Gasconade river, this range is of moderate elevation, hardly exceeding 500 or 600 feet above the sea-level, but its elevation increases farther south. Its highest point is about the sources of the White and Osage rivers, the two most considerable rivers which originate in these mountains. Farther south the range again decreases in elevation, until it terminates on the Arkansas west of Fort Smith, in some tolerably high hills. The mountains between the Arkansas and Red River form a continuous range, running east and west, and the highest summits, Mount Cerne, the Sugar-Loaf Mountains, and Cavaniol Mountain, attain an elevation of between 2000 and 3000 feet above the sea-level. The last-mentioned range is called the Masserne Mountains.

The country north of the Masserne Mountains and east running along the western edge of the Ozarks, vered with high hills, which extend eastward wn from the eastern extremity of the Masserne Mountains, near Little Rock or Arkopolis in Arkansas, to the town of St. Genevieve on the Mississippi (38° N. lat.). This extensive region, which constitutes the eastern broad slope of the Ozark, has an extremely broken surface. The hills and mountains, which are scattered over it in confusion, rise from 800 to 1800 feet above the sea-level, and from 500 to 1500 feet above their base. They are exceedingly numerous, and are divided into a multiplicity of knobs and peaks, which have rounded summits, and descend with perpendicular cliffs and abrupt precipices. Sandstone is the principal component of these mountains, but their surface is frequently strewed with a profusion of flinty fragments, and in many places it is covered by compact limestone. The hills, which are covered with limestone, contain forests of pine and cedar; those of sandstone are usually overgrown with scrub oak, hiccory, haws, and brambles. The poverty of the soil in some instances and the scarcity of it in others prevent a more luxuriant vegetation from springing up. The valleys between these hills are rather narrow, but have uniformly a fertile soil. They are however occasionally subject to excessive floods, which are brought down from the mountains by the rivers, a circumstance which renders their cultivation very precarious.

As this extensive mountain region has been very imperfectly explored, we are not acquainted with its mineral wealth. Coal and iron certainly occur in many places. Copper-ore has also been observed. Lead is abundant, especially towards the most north-eastern extremity of the region, which contains the rich lead-mines near Potosi in Missouri. [MISSOURI.] Rock-salt appears to occur in the Masserne Mountains; abundant salt-springs are found on the upper branches of the Washita river. These parts also contain hot-springs. [ARKANSAS.]

The origin of the word Ozarks seems rather doubtful. It does not appear to be a pure Indian form. It has been conjectured that it is derived from the French expression, 'Aux Arkansas,' abbreviated into 'Aux Ark,' the pronunciation of which is exactly represented in the English language by 'Ozark.'

(James's *Account of an Expedition to the Rocky Mountains, performed by Major Long*; and Nuttal's *Arkansas*.)

OZEROV, VLADISLAV ALEXANDROVITCH, the most distinguished tragic poet that Russia has hitherto produced, was born in the government of Tver, Sept. 29 (Oct. 11), 1770. After passing through the usual course of military service, in which, besides otherwise distinguishing himself, he rose to the rank of major-general, he exchanged it for a civil appointment, which he held till 1807, when he retired from public life. Instead however of devoting himself the more closely to his literary studies, he shortly after abandoned them, or at least discontinued writing, 'Polyxena,' which was first performed in May, 1809, being his last dramatic production. From that time to his death, which happened in November, 1816, he only composed three acts of an unfinished tragedy, entitled 'Medea,' and sketched the plans of two others, one of which had for its subject the siege of Damascus, and is said to have been founded on Hughes's English tragedy of the same name.

After a long and very severe illness, he was carried off at the age of forty-six.

All that can be gathered from what Prince Viazemsky says in his memoir of him, as to the cause of his doing nothing for so many years, is, that he was disgusted with the world on account of the mean enmity which his talents had raised up against him, though his productions had been most favourably received by the public.

Although the pieces upon which his fame rests do not amount to more than four, his first drama, entitled 'The Death of Oleg,' bearing no comparison with his succeeding ones, Ozerov may be considered not merely as the reformer, but as in a manner the creator of Russian tragedy. Kniazhin had improved upon Sumarokov, but chiefly in regard to style and manner: neither genuine poetry nor masterly delineation of character is to be met with in their tragedies. It was reserved for Ozerov to infuse vitality into the previously cold and lifeless form. His 'Œdipus,' 'Fingal,' Demetrii Donskoi,' and 'Polyxena,' are all severally masterpieces, full of poetry; and although simple in plan, and with more of dialogue than action, strikingly dramatic in some of the situations.

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P.

P is the tenuis or thin letter of the labial series. For the various symbols employed to denote this letter see ALPHABET.

This letter is interchangeable with those which belong to the same organ, that is, the lips, and with some others. Thus

1. P is convertible with *b*. The Latin, like the Welsh, was fond of the thin letters, in consequence of which there are very few words in that language which begin with a *b*, while those commencing with *p* form a numerous class. It will often be found that the *p* in Latin words becomes a *b* in the related languages. Thus *apicula*, the diminutive of *apis*, a bee, is in French *abeille*; *septem* is in German *sieben*. The German language often confounds *b* and *p*, more particularly when the former is final. Perhaps, too, even in Latin, the written *b* was pronounced as a *p* in the prepositions *ab*, *sub*, *ob*, which correspond to the Greek ἀπο, ὑπο, ἐπι.

2. *P* with *m*, somewhat rare. Thus the Greek preposition μετα is in the Æolic dialect πεδα. Again, the Greek μολυβδος is essentially the same word with the Latin *plumbum*. Allied to this change is the insertion of a *p* between either *m* and *s* or *m* and *t*, as in the Latin *sumpsi*, *sumptus*, for *sumsi*, *sumtus*, and *temptare* for *tentare*.

3. *P* with *v*. This change is more particularly to be observed in the derivation of French from Latin. Thus from *capillus*, hair, *episcopus*, a bishop, *decipere*, deceive, &c., *aperire*, open, *opera*, work, *lepus*, hare, *pauper*, poor, *piper*, pepper, *Aprilis*, April, the French have deduced their *cheveu*, *evêque*, *decevoir*, &c., *ouvrir*, *œuvre*, *lièvre*, *pauvre*, *poivre*, *Avril*.

4. *P* with *f*. Two or three examples are given under F. To these may be added *pro*, *for*; *pater*, *father*; *piscis*, *fish*; *pauci*, *few*; *lupus*, *wolf*. So the Greek πορφυρα, πομφολυξ, Φοινιξ, have the aspirate, while the Latin, as usual, prefers the tenuis in *purpura*, *pustula*, *Poenus*.

5. *P* with *pf*. The latter form is often preferred by the German, where our own tongue has the single letter. Thus the English words *pound*, *peach*, *pepper*, *pea-cock*, *penny*, *apple*, are written by the Germans *pfund*, *pfirsche*, *pfeffer*, *pfau*, *pfennig*, *apfel*.

6. *P* with *c*, *k*, or *q*. See C.

7. *P* with *t*, as πως, in Latin *quo*. The Greek interrogative words beginning with a π, as πως, πη, ποτερος, &c., are related on the one hand to the Ionic forms κως, κη, κοτερος, and on the other to the demonstratives that commonly take a τ at the beginning. And in fact the latter are often used as relatives.

8. *P* with *pt*. The latter is common in Greek, as in τυπτω, κοπτω, &c., which form their other tenses for the most part without a τ. So too at the beginning of words. Thus πτολις and πτολεμος coexist with πολις and πολεμος; and it seems probable that it was an unsuccessful attempt to pronounce the initial *pt* which led to the formation of the Latin words *populus*, a state, and *populari*, to devastate with war.

9. *Ps* with *sp*. This change it will be more convenient to consider under the letter S.

10. *Pi* before a vowel with *ch*. Thus *sapiam*, in Latin, becomes *sache* in French. The word *roche*, too, was probably formed from a barbarous Latin word *rupia*; and *Rutupiae*, in the county of Kent, appears upon this principle to have changed its name to *Rich*-borough.

PAAMUTO ISLANDS. This is the native name of a great number of islands, or rather clusters of islands, scattered in the Pacific Ocean between 13° and 23° S. lat. and 130° and 150° W. long. On our charts they bear the name of the Dangerous Archipelago.

These islands are very numerous, and it is supposed that all of them have not been seen by Europeans. They constitute, according to Capt. Fitzroy, between seventy and eighty groups. Each group surrounds a lagoon, and is based on the coral reefs which enclose the lagoon. The islands are very little above the level of the sea. Their form is generally that of a crescent, the convex side being turned to the trade-winds. The highest part of the islands is in most cases on the most eastern part of the curvature, but it rarely exceeds six feet above high-water mark. The coral reefs which surround the lagoon have usually one opening or more, by which the enclosed sea may be entered. By far the largest number of these groups have at least one harbour in each cluster accessible to shipping; and a considerable trade has been carried on with the natives for pearl oyster-shells. Fish and shell-fish, hogs, and cocoa-nuts are the principal sources of subsistence to the natives. The natives are of the Malay race, and resemble the Otaheitans in person and language, though the languages differ so much that the Otaheitans and they do not easily understand one another. The question has often been asked, how the Malays could have spread to these remote lands against the direction of the trade-wind. Capt. Fitzroy solves this problem by stating that during the settled weather and a steady trade-wind (south-easterly) the surface waters in general move westward from five to twenty miles a day; but that in the rainy season from October to March, when westerly winds, squalls, and rain are frequent, the currents vary considerably, and occasionally set *eastward*, at the rate of from half a mile to two miles an hour. Thus it happens that canoes are drifted out of their course even several hundred miles by currents and westerly winds. The same seaman estimates the population of these islands at not less than 10,000, and not more than 20,000, exclusive of children; but he found them less advanced in civilisation than the inhabitants of the mountainous islands. The inhabitants of the Paamuto Islands, which are not very remote from Otaheite, receive laws from the sovereign of Otaheite; they have however no resident authority among them except the head of each family. The navigation between these islands is very dangerous, as many coral reefs, which are either dry or only just covered with water, are dispersed among them, and the sea surrounding the lagoons has no soundings.

(Fitzroy, in the *Narrative of the Surveying Voyages of the Adventure and Beagle*; Beechey, *Voyage to the Pacific and Behring's Strait*; Krusenstern's *Mémoires*, &c.)

PACA. [CŒLOGENYS.]

PACE (*Passus*), a measure of the Roman system, being in fact their unit of itinerary measure, to which the *mille passus*, or MILE, was referred. The word *passus* is connected with the root of *pandere*, to extend, and Paucton curiously enough derives it *à passis manibus*, from the length between the extended hands, instead of *à passis pedibus*. There is however reason to believe that the mille passus came into use from the practice of measuring distances in new countries from the number of paces marched by the soldiery, of which a rough reckoning was kept, but whether by actually counting the paces, or by the time of marching compared with the previously known number of paces in a given time, is not known. It is well known that with disciplined soldiers either method would give very good practical results. Vitruvius describes a machine to be fastened to the wheel of a chariot (an invention revived in our own day), by which its number of revolutions was registered; but this was probably a late invention.

The pace was not, as persons in general suppose, the step, or the distance from heel to heel when the feet are at their utmost ordinary extension; this, which the French metrologists call *pas simple*, was the *gradus* or *gressus*. The passus, or *pas double* of the same writers, was two gradus, or the distance from the point which the heel leaves to that on which it is set down. Assuming the Roman foot at 11·62 English inches, the pace, which was five feet, must have been 58·1 inches or 4·84 English feet.

Here we might have stopped, if it had not been necessary to explain something relative to what it pleased the writers of the middle ages to call the *geometrical* pace, composed of five geometrical feet. What they meant by this measure is not easily understood, except by the supposition (which some of their writings confirm) that they imagined a fixed and universal measure of length to exist in nature, and to have been actually obtained. At the beginning of the sixteenth century the Roman mile, at least the mile of 5000 feet or 1000 paces, was generally used by writers [MILE], and itinerary measures were more often written about than verified. The stadium, or eighth part of this mile, had also been introduced (into books) from the Greek system, and it was the common opinion, derived from Ptolemy, that the degree of latitude was exactly 500 stadia, or 62½ miles. This made the pace, or the 125th part of the stadium, stand forward as a proper universal measure, being the 62500th part of that which all believed the degree of latitude to be. But though this may be a probable origin of the geometrical pace, it is certain that writers did not adhere uniformly to it, so that the later metrologists have formed different notions of its length. We shall give the accounts of several modern writers.

Dr. Bernard makes the geometrical pace (which he also calls the land-surveyor's pace) to be five English feet. Greaves supposes that a pace of upwards of 69 inches was once in use in England. Ozanam makes the geometrical pace to be the same as the Roman pace. Eysenschmidt does not mention the measure at all. Paucton (who has a theory about the derivation of measures from parts of the human body) makes it only 4¼ Roman feet. Romé de L'Isle, who contends that Paucton has several times confounded the Greek Olympic foot with the Roman foot, makes it 4¼ Olympic feet, that is, 4¼ English feet very nearly. An older writer, Samson d'Abbeville, cited by Paucton, lays down the geometrical pace at 5 French feet, and nevertheless makes the Roman mile to contain a thousand such paces. The conclusion is, that the geometrical pace was an invention of the old writers, a needless addition to the confusion in which their accounts of antient measures were already enveloped.

There is a pace mentioned in ecclesiastical writers called *passus ecclesiasticus*, or *dexter* (see Ducange, at the word Dextri), which Dr. Bernard, without stating any authority, makes of the same length as the English yard.

PACHO'MIUS. [MONACHISM.]

PACHYCE'PHALA. [VIREONINÆ.]

PACHYCEPHALI'NÆ, Mr. Swainson's name for the Great-headed Chatterers, which form, according to his first arrangement in his *Classification of Birds*, the second subfamily of the *Ampelidæ*, or family of Chatterers, and are placed between *Leiotrichanæ* (Long-legged Chatterers) and *Bombycillinæ* (Swallow Chatterers), the other two subfamilies being the *Ampelinæ*, or True Chatterers, and the *Piprinæ*, or Manakin Chatterers. Of these subfamilies he considers *Leiotrichanæ*, *Pachycephalinæ*, and *Bombycillinæ* to be aberrant.

In the *Synopsis* in the same vol. (2), the family *Ampelidæ* are made to consist of the following subfamilies:—*Leiotrichanæ*, Silky Chatterers?; *Vireoinæ*, Greenlets and Thickheads; *Bombycillinæ*; *Ampelinæ*, Typical Chatterers; and *Piprinæ*, Manakins, subtypical.

In this last arrangement, *Pachycephala* is placed under the subfamily *Vireoinæ*. [VIREONINÆ.]

PACHYDE'RMATA (literally *Thick-Hides*; *Dickhäuter* of the Germans; *Pachydermes* of the French), the seventh order of mammiferous quadrupeds according to the system of Cuvier as set forth in his *Règne Animal*.

The *first* family of Pachyderms in this arrangement consists of those which have a proboscis and tusks, and which are named *Proboscideans*.

The *Proboscideans*, in the opinion of Cuvier, have many resemblances to certain *Rodents*: for instance, their great incisors (so to speak); their jaws, which are often formed of parallel laminæ; the form of many of their bones, &c. The whole of this family have five toes on each foot, completely formed in the skeleton, but so incrusted in the callous skin which surrounds the foot, that there is no appearance of them externally, except as they may be traced by the nails attached to the border of this species of shoe. The canines and incisors, strictly speaking, are wanting; but there are two tusks implanted in the incisive bones, which two tusks project from the mouth, and often grow to an enormous size. The proportions necessary for the alveoli or sockets of these tusks, render the upper jaw so high, and so much shorten the bones of the nose, that the nostrils are found in the skeleton towards the upper part of the face; but, in the living animal, they are prolonged into the well known proboscis or trunk, of which the reader will find a description under the article ELEPHANT. The parietes of the cranium contain large spaces for rendering l light; and the lower jaw has no incisors; as may n the same article. The intestines are voluminous, ich simple, and the cæcum enormous. The *mammæ*, two in number, are situated on the breast; and the young suck with the mouth, and not with the trunk, as some had erroneously supposed. The only living genus of Proboscideans is *Elephas*. [ELEPHANT.]

The other genus is extinct, and consists of the *Mastodons*. [MASTODON.]

The *second* family, *The Ordinary Pachyderms*, have either four, three, or two toes.

*

Those which have the toes equal are in some sort cloven-footed, and, in many respects, approximate the ruminants in the skeleton and in the complication of the stomach.

Living genera, *Hippopotamus* [see the article] and *Sus* (Linn.). [SUIDÆ.] Extinct genus, ANOPLOTHERIUM.

**

Those which are not cloven-footed form genera which very much resemble each other in the jaws, in having on each side seven upper molars with square crowns and various projecting lineaments, and seven lower ones with a double crescent on the crown, the last of all having a triple crescent; but their incisors are different.

Genera.—*Rhinoceros*; *Hyrax*; *Palæotherium*; *Lophiodon*; and *Tapir*. [See the articles.]

The third family consists of the *Solidungula*, which apparently have but one toe and a single hoof or shoe to each foot, but on each side of the metacarpus and the metatarsus are bony points or processes which represent two lateral toes.

Genus *Equus*, Linn. [HORSE.]

To these may be added the following extinct genera:—*Chalicotherium*, allied to the Tapirs [TAPIR]; *Chæropotamus*, belonging to the SUIDÆ; *Anthracotherium*, allied to *Chæropotamus* and the *Dichobunes* (*Palæotherium*); *Elasmotherium*, placed by Fischer between *Rhinoceros* and *Hyrax*; *Cœlodonta*, arranged by Meyer between *Rhinoceros* and *Dinotherium*; *Caïnotherium*, placed by Meyer between *Anoplotherium* and *Palæotherium*; and *Adapis* [ADAPIS]; and *Hippotherium*, an animal allied to the horse. [HIPPOTHERIUM.] *Dinotherium* is considered by Professor Kaup and others to be nearly allied to the *Tapirs*, in which case the extinct animal must doubtless find a place among the *Pachydermata*. [DINOTHERIUM; TAPIR.]

PACHY'MERES. [BYZANTINE HISTORIANS, p. 82.]

PACHYMY'A, Mr. James Sowerby's name for a genus of fossil conchifers thus characterised:—

Shell bivalved, transversely elongated, very thick, subbilobate, with the beaks near the anterior extremity. Ligament partly immersed, attached to prominent processes or fulcra. (J. S.)

To *Modiola* it bears much analogy in the position of the umbones or beaks, the elongated form of the valves, and the partial separation of the anterior portion into an imperfect lobe. It is distinguished from the thin shells allied to *Mytilus* by its comparatively short ligament fixed upon a strong prominent part of the shell within the edge. [MYTILIDÆ.] The genus is founded on a species, *Pachymya Gigas*, from the lowest part of the chalk formation near Lyme Regis. (*Min. Con.*)

PACHY'PTILA. [LARIDÆ, vol. xiii., p. 334; PETRELS.]

PACHYRYNCHUS. [PSARIANÆ.]

PACHY'STOMA, the Rev. Lansdown Guilding's name for a genus of his *Ampullariadæ*. The shell is described as having a thick marginated lip, frequently channelled, and a testaceous operculum. The genus is divided by Mr. Guilding into two sections: 1, consisting of the species which have a small umbilicus and a globose shell (*Ampullariæ globosa*, *corrugata*, and *puncticulata*, Sw.); 2, containing only one species (*Ampullaria crassa*, Sw.) with an evanescent umbilicus.

PACHY'TES. [DIANCHORA; SPONDYLUS.]

PACHYTHE'RIUM. M. Lund's name for an extinct genus of mammiferous quadrupeds approaching *Hoplophorus*, but of larger proportions than that genus. [MEGATHERIIDÆ, vol. xv., p. 73.]

PACIFIC OCEAN, THE, extends between America on the east, and Asia and Australia on the west. It received this name from Magalhaens, the first European who traversed it, and who, having experienced bad weather and heavy gales in the Strait of Magalhaens, sailed into the wide expanse of this ocean with a moderate south-east trade-wind, and enjoyed fair weather without interruption. He accordingly called it the Pacific. It is also called the South Sea, because vessels sailing from Europe can only enter it after a long southerly course. The name of South Sea has been limited in later times to the southern portion of the Pacific.

The Pacific is the greatest expanse of water on the globe, of which it covers more than one half of the surface. The area is roughly estimated at more than a hundred millions of square miles. Behring's Strait, which may be considered as its most northern boundary, lies between East Cape in Asia and Cape Prince of Wales, near 66° N. lat., and is less than 50 miles wide. From this point southward, the coasts of both continents, which enclose the Pacific, recede rapidly from one another, and at 55° 30′ N. lat., between the western point of the peninsula of Alashka and Cape Kronotskoi Noss in Kamtchatka, they are upwards of 1200 miles apart. Near the northern tropic, Cape S. Lucas in California is about 8000 miles from the coast of China east of Canton; and this may be considered as nearly the average width of the Pacific between the tropics. Near the southern tropic, Sandy Cape in Australia is about 8200 miles from the northern coast of Chile. Towards the southern extremity the Pacific is divided from the Atlantic by a line drawn from Cape Horn to the antarctic pole, and from the Indian Ocean by another line drawn from South-West Cape in Tasmania (Van Diemen's Land) to the same pole.

The Pacific does not, like the Atlantic and Indian Oceans, send off branches, which penetrate deeply into the adjacent continents; but extensive peninsulas project from the continents which border on it, and these, together with some adjacent rows of islands stretching far into the sea, separate considerable portions of it from the main body of the ocean. This is less the case on the American than on the Asiatic side. Only two peninsulas project from the American continent. The peninsula of California divides the Gulf of California [CALIFORNIA, GULF OF] and the peninsula of Alashka with the Aleutian Islands divides the Kamtchatka Sea, from the Pacific. The peninsula of Kamtchatka, which projects from the continent of Asia, divides the Kamtchatka Sea from the Sea of Okhotzk, which latter is separated from the open expanse of the Pacific by the Kurile Islands. The western shores of the Sea of Okhotzk are partly formed by the island or peninsula of Tarakai (or Saghalien), which projects at a very acute angle from the continent of Asia; and the islands of Jesso and Nipon and the peninsula of Corea enclose the Japan Sea on the north, east, and south. The Yellow Sea, or Hoang-hai, which is farther south, is less distinctly separated from the Pacific than the seas farther north; still the boundary-line between both seas is marked by a series of islands, which extend from the most southern extremity of the island of Kiusiu to the northern extremity of Formosa. This remarkable formation continues still farther south, and the Chinese Sea, which extends from the island of Formosa on the northern tropic to the equator, though it properly belongs to the Indian Ocean, must be considered as the last link in this chain of sea-basins. On the north the Chinese Sea is separated from the Pacific by a single row of islands, and farther south by a double and triple row. Thus we find, that though the continent of Asia forms the western boundary of the Pacific north of the equator, no part of it is immediately washed by that ocean, and its shores can only be reached by passing through one of these subordinate sea-basins.

This peculiarity of formation in the western parts of the Pacific appears to be mainly, if not exclusively, the effect of volcanic agency, when we consider that the peninsulas and islands, which separate the smaller basins from the main body of the sea, are either generally composed of volcanic rocks, or exhibit frequent and unequivocal traces of having been convulsed by subterraneous fire. Active volcanoes are still very numerous on them, and they form a continuous series which encircles the eastern coast of Asia like a girdle. The most northern of these active volcanoes which is known is that of Schiwelutschkaja in Kamtchatka (near 56° N. lat.), and it is followed by 13 or 15 others, all of which lie close to the shores of the Kamtchatka Sea on the eastern coast of the peninsula. The volcanic chain continues in the same direction, south-westward, nearly in a straight line to the island of Formosa on the tropic of Cancer. It forms the base of the Kurile Islands, on which at least ten active volcanoes are known to exist; appears in several places on the eastern and southern coasts of Jesso, and in the islands of Nipon and Kiusiu; and terminates in that direction with three if not more volcanoes on the island of Formosa. From the last-mentioned island the volcanic chain runs southward to the island of Luzon, where it declines a little to the east, traversing the peninsula of Camarinas (the southern part of Luzon), the other Philippine Islands and Mindanao, whence it passes to the north-eastern extremity of Celebes and the Moluccas. The last-mentioned islands exhibit everywhere traces of volcanic action, and contain several active volcanoes near 8° S. lat. The volcanic chain seems to terminate in that direction, or rather it turns westward nearly at a right angle, and continues through the Indian Ocean along the chain of the Sunda Islands. But near the equator, a branch of the chain runs off to the east along the northern coasts of Papua, or New Guinea, and continues through New Britain and the New Georgian Archipelago, where it begins to decline to the south. It is traced through the New Hebrides to the island of Tana. The most southern point of this lateral volcanic chain seems to be the small island called Matthew's Rock, south-south-east of Tana (22° 20′ S. lat. and 171° 15′ E. long.). In the northern island of New Zealand there are also unequivocal traces of volcanic agency. Thus we find that the western part of the Pacific is traversed by a volcanic chain, which extends from the neighbourhood of the northern polar circle nearly to the southern tropic.

Another series of volcanoes surrounds the Pacific on the east, but they are situated on the continent of America. These volcanoes do not constitute a continuous chain: they rather occur in extensive groups, at great distances from one another, but each group by itself may be considered as a chain. It is still doubtful whether active volcanoes exist on Tierra del Fuego. The British officers who surveyed these coasts some years ago do not appear to confirm the opinion of volcanoes existing on that group of islands. Near 50° S. lat. there are extensive fields of lava on the banks of the river Santa Cruz, but no active volcano has been observed in the Andes south of the volcano of S. Clemente, which is near 46° S. lat. With this summit begins the group of the Chilian volcanoes, which extends northward to 30° S. lat., where it terminates in the small volcano of Coquimbo. The number of active volcanoes in this group is about twenty; ten of them are between 40° and 35° S. lat. The most elevated is that of Aconcagua, near 32° 30′, which, according to the most recent information, attains an elevation of nearly 24,000 feet above the sea-level, and is the highest volcano on the globe. No active volcanoes occur in the Andes between 30° and 22° S. lat. Between 22° and 21° S. lat. is the Volcano de Atacama, the commencement of the Bolivian volcanoes, which extend northward nearly to 15° S. lat., and terminate with the extinct volcano of Chacani. The number of active volcanoes is five or six, and all of them are situated in the chain of the Andes west of the valley of Titicaca. Another break follows, which extends to near 2° S. lat., where the volcano of Sangay forms the commencement of the group of the equatorial volcanoes, which extend to about 5° N. lat., or to the Paramo de Ruiz, which was active in 1828. The number of active volcanoes, or of those whose eruptions are on record, is about ten; the most northern are in the chain of the Central Andes, between the valleys of the rivers Magdalena and Cauca. These are the three volcanic groups in the Andes of South America. On the Mexican Isthmus three groups of volcanoes occur between 9° 30′ and 19° 30′ N. lat. and 83° 30′ and 104° W. long. The most eastern are the volcanoes of Costa Rica. On the table-land of that name, between 9° 20′ and 10°, there are at least six active volcanoes close together. North of 11° N. lat. begins that chain of volcanoes which surrounds the Lake Nicaragua on the south, west, and north, and continues along the shores of the Pacific, and at no great distance from it, to the volcano of Soconusco (near 15° N. lat. and 94° W. long.). The number of active volcanoes may be about ten. The third group lies across the Isthmus near 19° N. lat. and contains six active volcanoes. On the peninsula of California, one of the three summits called the Virgins is an active volcano, but it appears to stand alone. Mount S. Helens, situated at some distance from the northern banks of the Columbia river, is also said to be an active volcano. The chain of the Aleutian Islands, which contains more than twenty active volcanoes, connects as it were the American volcanoes with those of Asia. The most western volcano, situated on the island of Little Sitkhin, is not much more than 500 miles from the series of volcanoes which line the eastern coast of Kamtchatka. The volcanoes of the Aleutian Islands also partake more of the nature of the Asiatic chains than of the American groups.

Though the Pacific covers more than one half of the surface of the globe, it receives the drainage of a comparatively small portion of the land. In South America, the watershed between the rivers which run into the Pacific and the Atlantic is hardly a few miles from the shores of the former towards the southern extremity of that continent. North of 40° S. lat. it is widest, the Andes being nearly 100 miles from the coast opposite the mouth of the Rio Biobio in Chile (37° S. lat.), but as they advance north, they approach nearer, and in all the remainder of South America the watershed is never more than 60 miles distant from the Pacific Ocean. Thus the Pacific receives hardly more than one twenty-fifth part of the drainage of South America. In the Mexican isthmus, as far west as the isthmus of Tehuantepec, the watershed continues at a short distance from the Pacific, never receding more than 40 miles, and frequently approaching it within less than 10 miles. West of the isthmus of Tehuantepec it gradually recedes farther, and at 20° N. lat. it is more than 300 miles from the shores of the Pacific; but farther north it again approaches to a distance varying between 120 and 200 miles. The countries of the Mexican isthmus, which send their drainage to the Pacific, probably constitute not more than one-eighth of that division of America. In North America (north of 32° N. lat.) the watershed lies much more towards the interior of the continent, being between 35° and 45° about 750 miles from the Pacific; but farther north it is only about 350 miles from it. The area of the countries of North America whose drainage runs to the Pacific probably does not exceed one-fifth of the whole surface. According to this rough estimate, the Pacific receives not quite one-tenth of the drainage of America.

In Asia, the watershed between the rivers which fall into the Arctic Ocean on one side and into the Pacific on the other is likewise at no great distance from the latter, north of the mouth of the river Amur, but the basin of this river extends above 1200 miles into the interior of Asia, and it is followed on the south by the basins of the rivers Hoang-ho and Yantse-kiang, which reach somewhat farther inland. The basins of these three rivers, added to those of a few others of inconsiderable extent, may comprehend nearly one-seventh part of the area of Asia, and so much of the drainage of that continent enters the Pacific. In Australia, as far as the country has been explored, the line which divides the waters which run into the Pacific from those which flow off in another direction is hardly anywhere more than 100 miles from the great ocean, and we may suppose that only one-tenth of the drainage of that continent is poured into that sea.

The shores of the continents which are washed by the Pacific are in general high and rocky. Along the coast of South America, south of the equator, they generally rise several hundred feet, except at the embouchures of the small rivers. No part of this coast presents an alluvium of any great extent. Along the Bay of Choco, which begins on the south near 3° N. lat., the shores are low but rocky; they rise a few feet above high water-mark, and the rocks are covered with an alluvial soil. The low shores continue through the Isthmus of Panama, but they rise again to a considerable height where the table-land of Veragua projects like a vast promontory into the ocean. This high coast reaches as far west as the vicinity of Realejo, where a sandy shore extends for several miles. High volcanic mountains surround the Bay of Conchagua, but west of it follows a low rocky coast covered with alluvium, which extends to the town of Tehuantepec. On the shores farther west the high land again comes close to the sea, forming a rocky coast of considerable elevation, which extends beyond 103° W. long. Then follows a low but probably rocky coast for nearly a hundred miles, which is succeeded by a more elevated coast extending to the port of San Blas. The eastern coasts of the Gulf of California are of moderate elevation and not rocky, and north of 28° N. lat. they become low and sandy; but the western shores of that gulf are rocky and elevated, except north of 30° N. lat., where a flat sandy beach extends to the mouth of the Rio Colorado. The western coasts of the peninsula of California rise with a steep rocky ascent to a considerable elevation, and the coasts preserve this character through the whole extent of North America, with the exception of the country surrounding the Bay of S. Francisco and a comparatively small tract of low country at the mouth of the Columbia river. North of the peninsula of Alashka, along the Kamtchatka Sea, the shores are of moderate elevation, and in general not rocky.

The coast of Asia along the western side of the Kamtchatka Sea is very rocky, and in many places of great elevation; this description applies likewise to the coasts of the Sea of Okhotzk and the Japanese Sea. The western coast of the peninsula of Corea is likewise high and rocky, but the western shores of the Yellow Sea, or Hoang-hai, are, with the exception of the peninsula of Shantong, very low, and consist partly of sand and partly of an alluvial earth; the latter principally occurs between the mouths of the Hoang-ho and Yantse-kiang. South of 30° N. lat. the coast of China is rocky, but in general of no great height. The eastern coast of Australia, as far as it is known, is chiefly rocky, but it does not attain a great elevation.

Turning from the countries which surround the Pacific to the interior of the ocean, we find that the eastern, northern, and southern portions are remarkably free from islands. In an extent of sea far exceeding the Atlantic in area, and bordering on the western shores of America, only a few isolated islands occur, and one considerable group, the Galapagos Islands. Between the coast of South America and Australia, south of 24° S. lat., only the large islands called New Zealand are situated; and in their vicinity there are a few small groups and islets: in the remainder of this vast extent of sea hardly four or five islands or diminutive groups are known to exist. But another portion of the ocean is abundantly diversified with islands of various dimensions. This portion of the sea lies between the two tropics, and extends from the western boundary of the Pacific eastward to 135° W. long., or over more than half the width of the ocean. To the north of the equator the islands and groups, though numerous, are much less so than to the south of the line. The islands of the Pacific are both low and elevated. The low islands are of very small extent, and are based on coral reefs, which encircle a small space of sea. This enclosed space resembles a lagoon, and these islands are often called Lagoon Islands. It was formerly supposed that these islands owed their origin entirely to the madrepores and other marine animals; but since it has been ascertained that these animals cannot exist in a depth of more than about ten fathoms, and as the islands rise with great steepness from a sea usually more than 300 fathoms deep, the question of the origin of these islands has engaged still more the attention of several naturalists. [Reefs.] The volcanic islands are of moderate extent, and generally rise to a great elevation in their centre. Besides the different groups which lie in a line from the eastern extremity of Papua to Matthew's Rock, and which have been already mentioned, several groups of volcanic islands are dispersed in the ocean. The groups of this description north of the equator are the Bonin Sima, Ladrone, and Sandwich Islands. The Galapagos are traversed by the equator. South of the equator are the volcanic groups of the Marquesas, Society, Navigator, and Friendly Islands, and the solitary Easter Island. Some of these volcanic islands are encircled by coral-reefs, as the Society, Navigator, and Friendly Islands: others have not such a circle of reefs, as the Sandwich, Ladrone, Bonin Sima, Galapagos, New Georgian Archipelago, and New Hebrides. The islands which do not belong to the volcanic or lagoon islands are few in number: the largest of them is New Caledonia, for the northern of the New Zealand islands is volcanic; as to the southern, we know nothing of it. A portion of the Pacific has a peculiar character. Flinders calls it the Corallian Sea, and determines its extent by assigning Papua and Luisiade as its northern boundary; whilst the north-eastern coast of Australia up to Sandy Point (21° 40′ S. lat.) encloses it on the west, and on the south a line drawn from Sandy Point to the Island of Pines near the southern coast of New Caledonia. On the east it seems to terminate at some distance from the New Hebrides. It extends more than 1000 miles in length, and about 600 in width. The whole space is covered with innumerable coral-reefs and banks, which have only a few feet of water on them, and are very dangerous to the navigator. This is probably both the largest and the most extraordinary reef in any part of the world. It is divided from the continent of Australia by a space of sea free from islands, in general from 20 to 30 miles and in some places even 60 and 70 miles coast. The area of the sea has generally a depth of between ten and twenty fathoms, but this depth increases towards the south to forty and even sixty fathoms.

The islands of the Pacific are inhabited by two, or, if the large island of Papua is included, by three races of men. *Papua* contains two different nations, the Papuas and the Haraforas or Alfoers [PAPUA]; and it is not improbable that these two races are also to be met with on the larger islands east of Papua, as in New Britain and New Ireland. The islands forming the volcanic chain which stretches from Papua eastward and afterwards inclines to the south-east and south, together with the large island of New Caledonia, are inhabited by a race resembling the negroes, and hence they have obtained the name of Austral negroes. It is generally supposed that the black inhabitants of these islands and the natives of the continent of Australia are of the same origin; but this point has not been well established. The Papuas, as the inhabitants of the islands are usually called, certainly resemble, in their hair, colour, and some other features, the natives of Australia; but the whole frame of their bodies is different, and, as it appears, the facial line also. They are still more distinguished by their mental qualities and the higher state of civilization which they have attained. Whilst the Australians have remained in a state little above that of animals, living without dwellings and covering, and using for food the crude productions of nature, shell-fish, and the fruits of wild bushes and trees, the Papuas build large houses, which are well arranged, cover a part of their body with stuffs made from the bark of trees, and cultivate several plants and trees for food. This superiority of the Papuas over the Australians is not less evident in the skill with which they make their arms, and especially in the construction of their boats, which are frequently fifty and sixty feet long, and so well built that voyages of a hundred miles are made in them. The Australians, we believe, have never ventured to leave their shores, and never built any boats. The Papuas also rear several domestic animals, as hogs, dogs, and fowls. The Australians never seem to have made any attempt of the kind. The former live in regular political societies, whilst the Australians do not seem to know any other bond than that of the union of families. Our knowledge of the languages spoken by the different societies of the Papuas is far from being sufficient to enable us to determine whether there is such a similarity between them as to lead to the inference of their being derived from one common stock.

All the islands east and north of the volcanic chain, as well as the large islands, including New Zealand, are inhabited by a race which, in their physical character and in the different dialects spoken by them, so strongly resemble the Malays, or inhabitants of the Indian Archipelago, that there can be no doubt of their common origin. In that part of the ocean where most of these islands are scattered, the direction of the winds and currents during the whole year is from the east to the west, and accordingly it seems difficult to understand how this race has spread from the west to the east against both winds and currents; and it may be supposed that the migration has taken place in the contrary direction. But the migration from the west to east is proved by the fact that, in proceeding in that direction, the number of species of cultivated plants and domestic animals is decreasing, which shows that those who migrated in that direction were not always able to take with them to their new abode all the plants and animals belonging to the place which they left. It is also to be observed that all the plants and animals in these islands are natives of the Indian Archipelago, and hardly any one of them was found in South America before the arrival of the Europeans. To show the possibility of the migration in an eastern direction, Capt. Fitzroy observes that we are too little acquainted with the direction of the currents between 10° and 20° S. lat. to say more than that in settled weather and a steady trade-wind (south-easterly), the surface-waters in general move westward from five to twenty miles a day; and that in the rainy season (from October to March), when westerly winds, squalls, and rains are frequent, the currents vary most, and occasionally set eastward at the rate of from half a mile to two miles an hour. He adds that there are numerous instances on record of canoes being drifted several hundred miles out of their course by currents and westerly winds, and that this fact may explain how the remote islands, as for instance Easter Island, may have been first peopled from the west.

Before the beginning of the present century only a few vessels visited the Pacific, and the number has only increased considerably since the independence of South America was established in 1820; our knowledge of those points which more immediately affect the navigation, the winds and currents, is therefore far from being so complete as that which we possess of the Atlantic in these respects. Still enough has been ascertained to make us acquainted with the principal facts.

The north-east trade-wind seems to be more regular than in the Atlantic, and its northern boundary does not vary so much. It is true that Cook, in passing from the Sandwich Islands to the coast of the North American continent, found the trade-wind as far north as 30° in the month of February; but as other navigators have not met it higher than 26° N. lat., it is probable that the wind which retarded the progress of Cook was a north-eastern wind of a changeable nature. Many later navigators met the trade-wind when the sun was in the southern hemisphere between 19° and 20° N. lat. From these facts it appears that in summer this wind extends to 26° N. lat., and in winter only to 20° N. lat.; and that the mean boundary may be placed at 23° N. lat., from which it does not recede more than three degrees. As to the southern boundary of this wind, our information is very scanty, a circumstance which seems to be due to the fact that navigators are seldom obliged to pass through the region of calms which intervenes between the two trade-winds, and that they avoid a course which is always attended with great delay. In the Atlantic the case is different, as every vessel sailing to South America or the Cape of Good Hope is obliged to pass the region of calms. It is therefore merely a conjecture when it is stated that the southern boundary of the north-east trade-wind varies between 3° and 7° N. lat., and that the mean boundary is between 4° and 5° N. lat.

Respecting the south-eastern trade-wind, Capt. B. Hall states that near the continent of South America, when the sun is in the southern hemisphere, the trade-wind extends to between 30° and 31° S. lat., and that in the opposite season it is met with four or five degrees farther north, near 25° S. lat. But Cook found that in the interior of the Pacific this trade-wind does not extend south of 20° S. lat., at least not when the sun is in the northern hemisphere. When the sun is in the opposite hemisphere, the regular trade-wind seems to advance to 25° or 26° S. lat. But according to several statements, it would appear that this wind is by no means so regular along its southern border as in the Atlantic, and that it is frequently interrupted by winds from the west and south-west.

In the Pacific, as in the Atlantic, the south-east trade-wind extends some degrees north of the equator when the sun is in the northern hemisphere. In the beginning of July, Capt. B. Hall met with it in 3° 30′ N. lat.; and this is the season in which it may be considered as advancing farthest to the north. The last-mentioned navigator observes that towards their northern boundary these winds blow from the south, but farther south gradually draw more to the east, and at their southern limit are quite easterly. In the opposite season, the south-east trade-wind seems to recede from one to two degrees south of the equator, as is the case in the Atlantic Ocean.

The want of exact information respecting the southern boundary of the north-east trade-wind renders it impossible to compare the extent of the Region of Calms in the Pacific with that in the Atlantic. It is certain that in the Pacific the central line of this region is north of the equator, but probably nearer to the line than in the Atlantic; perhaps between 2° and 3° N. lat. In passing this region the navigator meets with calms, interrupted by short squalls and accompanied by a little rain.

The south-east trade-wind is not met with near the coasts of South America, but only at a distance of from 300 to 400 miles. In the intervening space the wind always blows in the direction of the Andes from the south, changing during the day a few points to the west, and in the night freshening off from the land. These winds are always very light, and sometimes interrupted by calms. North of Guayaquil the winds always blow from the south-south-east, and are steady. The north-east trade-wind does not approach the coasts of the Mexican isthmus nearer than the south-east shore of South America. It is only met with at a distance of above 700 miles from the land. In the tract of sea lying between their eastern limit and the coast different winds prevail in the different seasons. From June to November, both included, the prevailing wind is from the north-west and west; it is very boisterous, and frequently comes in heavy gales, and tornados or furious squalls, which are accompanied by deluges of rain and most dangerous thunderstorms; they are sometimes interrupted by calms. These winds set in earlier at the eastern parts of the isthmus than in the western. At Panama they are expected in March, and at S. Blas in the middle of June. During this season the navigation along this coast is very dangerous; there are also few good harbours, and even most of them are abandoned by the inhabitants on account of their unhealthiness. In the opposite season, from December to May included, the prevalent winds between Panama and Cape Blanco de Nicoya are north-west and northerly, and they are pretty steady. From Cape Blanco de Nicoya to some distance east of Acapulco the winds blow from east and north-east, generally with moderate strength, but they are sometimes interrupted by hard gales from the north-east, which are called Papayagos, and are experienced between Cape Blanco (9° 30′ lat.) and Cape S. Catherine. They last for several days, with a clear sky overhead and a dense red haze near the horizon. Other gales of a similar description sometimes occur in this season east of Acapulco, opposite the isthmus of Tehuantepec, whence they are called Tehuantepec gales. They blow from the north. West of Acapulco, and from 60 to 100 miles from the land, the winds are variable, but the prevailing winds blow between south-south-east, and west-south-west. Nearer the coast, land and sea breezes are met with, blowing from the north-west during the day, and from north-east at night. They are experienced also east of Acapulco to a distance of about one hundred miles.

It seems that the trade-winds cease at a considerable distance from the eastern coasts of Asia, and that in the tract of sea bordering on these coasts they are replaced by variable winds blowing generally from north-west and south-west, and also from south-east. But our information on this point is far too scanty to entitle us to speak even with a moderate degree of certainty. We are likewise entirely ignorant of the limits where these winds cease opposite the eastern coasts of Australia. They seem to blow as far west as the Corallian Sea, a portion of the ocean which is very seldom visited by vessels. Along the coasts of Australia the winds are very variable.

In the region of the *variable* winds, south of the trade-winds, the weather and the turn and succession of the winds are, according to Capt. Fitzroy, remarkably uniform. According to his account, north-westerly winds prevail, bringing clouds and rain in abundance. South-westerly succeed them, and partially clear the sky with their fury; then the wind moderates and blows from the south-east quarter, where, after a short interval of fine weather, it dies away. Light airs spring up from the north-east, freshening as they wear round to north, and augment the store of moisture which they always bring. From the north they soon shift to the usual quarter, north-west, and between that point and the south-west they shift back sometimes for weeks before they take another turn round. It never blows hard from east, rarely with any strength from north-east, but occasional gales may be expected in winter (between June and August) from south-east. Heavy tempests blow from west-north-west to south-west. In the region of the variable winds north of the trade-winds, the winds usually blow from the north-west and west, and frequently in gales. When not strong, they are accompanied with heavy fogs. It seems however that in the subordinate basins along the coasts of Asia, the Yellow, Japanese, and Okhotzk Seas, easterly winds are prevalent. In the last-mentioned basin at least, east and south-east winds are constant in summer, and in winter are more frequent than other winds.

Respecting the *Currents* of the Pacific our information is still more scanty and doubtful. The facts which have been recorded, though numerous, are few when the immensity of the subject and the difficulties which arise from its peculiar nature are considered. These facts are also mostly disjoined, so that in many instances they cannot be connected without conjecture and hypothesis. Consequently little can be said on this subject.

It is certain that near the southern polar circle a con[illegible] portion of the surface of the ocean is in motion [illegible] north. This portion is situated between 140° and 200° W. long. North of 60° S. lat. it gradually turns eastward, and between 45° and 35° S. lat. it sets towards the coast of South America, where it seems to divide in the tract of sea west of the island of Mocha (38° S. lat.) and Cape Rumena (37°). The more narrow branch runs off southward towards Tierra del Fuego. It is frequently strong north of 40° S. lat., but feeble farther south, except during and before strong or lasting southerly winds. It continues along the southern coasts of Tierra del Fuego to Cape Horn westward, and is found in this part to run with an average rate of a mile an hour. Its strength is greater during westerly winds, and sometimes during easterly winds is nearly imperceptible. As the current sets rather from the land, it diminishes the dangers which attend the navigation along such a rocky coast. Opposite the island of Mocha and Cape Rumena, and some distance west of them, the current, according to Capt. Fitzroy, usually runs to the north-west at the rate of from half a mile to a mile and a half an hour. But the current is not wide; and from 20 to 30 miles from the land, it is hardly perceptible. This however seems to be the beginning of the Peruvian current, which runs hence northward along the western coast of America as far north as Punta de Pariña (near 5° S. lat.). The current extends about 100 miles from the coast, and is of moderate velocity, generally not exceeding a mile an hour. It is however remarkable on account of the cold water which it carries from the south to the north. The difference of the temperature of the water within the current and that of the surface of the ocean without the current is considerable. At Callao the former indicates 62° Fahr., whilst in the same latitude, but about 300 miles from the coast, the temperature of the sea is between 77° and 79°. From the Punta de Pariña the current recedes from the coast, running off in a north-western direction to the islands of Galapagos, enlarging in width, but increasing in velocity. Near these islands Capt. Fitzroy found the current setting north-west, and running between two and five miles an hour. Though the current has now reached the equator, its temperature has not increased. Along the southern shores of Albemarle Island, one of the Galapagos, the thermometer immersed in the sea only indicates 60°, while on the northern shores it stands at 80°. The high temperature of the water on the north side seems to be the common temperature of the sea near the equator, but Capt. Fitzroy ascribes it to a warmer body of water issuing from the Bay of Panama, which he considers as a sort of Gulf-stream. From the Galapagos the current runs westward towards the centre of the ocean, and it increases considerably in width, the northern border advancing some degrees north of the equator, while the southern runs south-west, and passes 10° S. lat. But its velocity decreases gradually as it proceeds westward, whilst its temperature increases. About the meridian of 103° W. lat., Capt. Beechey found it still running 28 miles a day. A difference between the water of the current and that of the sea without it is still sensible as far west as 150° and 160° W. long., where the former is about 77° and the latter is increased to 85°. Before the current reaches 180° W. long. it is lost in the drift-current, which appears in the ocean as far as the trade-winds prevail, and the difference of the temperature is no longer perceptible. Along the northern border of the Peruvian current, between 120° and 150° W. long. and between 5° and 10° N. lat., a current has been observed, which sets in an opposite direction eastward, but the facts are still too few to enable us to determine whether it is only the counter-current of the Peruvian current or a separate current.

The body of warm water which, according to Capt. Fitzroy, joins the Peruvian current near the Galapagos Islands, and which issues from the Bay of Panama, has been already mentioned. This body of water may be connected with the Mexican current, which runs along the coast of Central America and Mexico between 85° and 105° W. long. It is perceptible as far as 100 miles from the coast, but the current alternates. From December to April it runs eastward, and from May to December westward. The velocity is moderate, never exceeding one mile and a half in an hour. The temperature of the water has not been determined, but it is supposed that it is warmer than that of the sea farther west. Capt. Beechey found a girdle of warm water between the equator and 14° 22′ N. lat., in 102° W. long. This is the last permanent current which requires to be mentioned in the eastern portion of the Pacific south of the northern tropic.

The drift-current of the trade-winds seems to be much less rapid than in the Atlantic. According to Capt. Beechey it does not exceed five miles per day. But where this drift-current approaches the western borders of the Pacific, especially the islands which lie between the north-eastern part of Australia and the south-eastern coasts of China, and which occupy a space of 35 degrees of latitude, it begins to divide into several currents of greater velocity, among which three are noticed particularly. The most southern seems to separate from the drift-current between the Friendly and Fidjee or Viti Islands, between 170° and 180° W. long., and to run to the New Hebrides and New Caledonia, but it appears to be lost before it reaches the Corallian Sea. Little is known of it. The second lies much farther north, between the equator and 8° or 9° N. lat., and runs along the northern coast of Papua, or rather at some distance from it. It begins near 140° E. long., and terminates in the straits which divide the western extremity of Papua from Gilolo. This current is influenced by the monsoons prevalent in that sea, so that during the south-west monsoon it sets eastward, and westward during the north-east monsoon. It frequently runs with great velocity, especially in the western portion. The third current, which branches off from the drift-current of the trade-winds, is observed along the northern border of this region. It sets westward with moderate strength, until it is lost in the sea between the Philippine Islands and Japan opposite the island of Formosa. Its width is not well ascertained.

South of the trade-winds and without their reach, a current is observed along the eastern coast of Australia south of Sandy Point. It has been asserted that this current always sets southward; but the more accurate investigation of Jeffreys shows, that from 28° S. lat. to the southern extremity of Tasmania, or Van Diemen's Land, the current during the summer, or from August or September to April or May, sets along the coast, and seaward to a distance of 15 or 18 miles, to the west of south, with a force of about one mile and a quarter in an hour; but at the distance of between 18 and 50 miles, to the east of north, running about three-quarters of a mile in an hour. In winter, these currents run in the opposite direction. This is partly confirmed by Captain Fitzroy, who says, that in the passage from New Zealand to Sidney he found alternately northerly and south-easterly currents, and that while the stream set from the north the temperature of the water was 72°, but when the current ran from the south only 67°.

North of the drift of the trade-winds, a constant current is found to set along the southern coast of Japan eastward, and to decline at about 145° E. long. to the north. It runs with considerable strength, and is perceptible at a great distance from the shores. Whether this current, like the Gulf-stream in the Atlantic, traverses the whole breadth of the Pacific, is not known; but a strong current setting in an easterly direction in this portion of the Pacific was experienced by Kotzebue, who found that near 40° N. lat. he had been set five degrees of longitude in 15 days, or about 15 miles a day; and a current of similar strength seems to run along the northern coast of America from 55° to 30° N. lat., but along these shores it sets south-east.

It does not appear whether the last-mentioned current is connected with the current in Behring's Strait, but it is certain that a strong current sets through this strait northward, or rather north-north-east. It is strongest on the Asiatic shore, where it runs from two to three miles an hour, but on the American shore only one mile and a half on an average. This current prevents the masses of ice which surround the arctic pole from advancing southward and spreading into the Kamtchatka Sea: it presses them together between the northern shores of America and Asia, where they constitute an impenetrable barrier, and render abortive the attempts of the most skilful and boldest navigators to advance nearer to the pole.

The tracks kept by vessels in navigating a sea are of course determined by the knowledge which the seaman possesses of the direction of the winds and currents. We shall mention the most important of these tracks. Vessels bound from Valparaiso or any other port of Chile, for Callao or Guayaquil, keep along the shore of South America at no great distance from the land, as in these parts both winds and currents are always in their favour, both being to the north. But in the voyage from Callao and Guayaquil both the wind and current are contrary, and accordingly vessels after leaving these ports sail south-west or west-south-west, until, having obtained a distance of 300 or 400 miles from the land, they meet the trade-wind, by means of which they make southing until they get out of the trade-wind into the region of the variable winds, where they direct their course to the place for which they are bound. In winter therefore they sail southward to 30° or 31° S. lat., before they endeavour to make some port, and in summer only to 25° S. lat.

In sailing from the ports of Peru and Chile to those of Acapulco, S. Blas, and Guaymas, three different tracks are followed. From December to May, their course from Peru to Mexico generally lies near the continent and within the Mexican current, as this current sets westward during this season, and the winds along this coast are partly favourable. But in returning in the same season from Acapulco to Guayaquil or Callao, the vessels get out of the current by a southerly course and then sail parallel to the continent, but about 300 miles from it, until they come opposite the Bay of Panama, when they shape their course to the place of destination. This track is called by the seamen of the adjacent countries, *navigacion por el meridiano*. But from May to November the track of the sea along this coast is subject to hard gales and squalls and extremely bad weather, and the navigation is accordingly unsafe, and is avoided. During this season the vessels draw off from the shores to the distance of a thousand miles and more, and then, by means of the trade-winds and the prevalent currents, they try to make southing or northing, according to the direction of their voyage. This tract is called *navigacion por altura*. This course is chiefly kept by vessels sailing between the ports of Mexico and Chile. Those which sail from Mexico to Guayaquil or Callao keep closer to the shores of Central America, and when they have passed the Bay of Panama, they shape their course to Guayaquil and Lima.

The track most frequented in traversing the whole expanse of the Pacific from east to west and west to east, lies in the eastern portion of the ocean, in a south-eastern and north-western direction. Vessels leaving the ports of Mexico sail westward, but those from South America sail north-west, until they reach 20° N. lat., about ten degrees east of the Sandwich Islands. These islands, lying nearly in the middle of the track between South America and the Chinese Sea, are commonly resorted to for refreshments. From the Sandwich Islands the direction of the track is nearly west, between 15° and 20° N. lat., and the Chinese Sea is entered by the straits between the island of Luzon and that of Formosa. This is the northern track across the Pacific, and it is considered the shorter, because the voyage is thus made in less time than by the southern track; the latter is really somewhat shorter, but as it lies through a sea beset with numerous low islands and reefs, the vessels are exposed to much more danger, and the precautions necessary to avoid them cause a delay which renders the voyages longer than by the northern track. This southern great thoroughfare across the Pacific runs between the Paumoto Islands on the south and the Marquesas on the north, and lies mostly in the southern hemisphere, cutting the equator near 165° E. long., whence it continues north-west and joins the northern track between Luzon and Japan. These two lines are followed by vessels from the coast of South America; the northern also is followed by those from Central America and Mexico bound for China and the East Indies. But in these parts of the ocean the winds and currents being to the west, vessels which follow them on their return to America would meet with great delays, and therefore the tracks which they follow in sailing eastward lie beyond the limit of the trade-winds and their drift-current, either north of 30° N. lat. or south of 30° S. lat. Vessels sailing from the Chinese Sea to the ports of Mexico or the western coast of North America, and having passed either to the south or north of the island of Formosa, and usually on the north during the south-west monsoon, soon reach by a north-eastern course the sea where the trade-winds and their currents are not felt. In keeping north of 30° N. lat. they traverse a sea free from islands and dangers, and make the coast of the peninsula of California south of 36°, whence they direct their course to the port for which they are bound. Vessels sailing from Sidney to South America pass between New Zealand on the south and Norfolk Island on the north, and keep an easterly course until they enter the sea near the coast of South America, where the trade-winds do not blow and the current sets north. On arriving there, they reach their destination by the tracks already mentioned.

With respect to vessels sailing from Sidney to the Indian Archipelago, they may make the Western Passage, which lies through Bass's Strait and round Australia through the Indian Sea, or they may make the Eastern Passage. The Inner Eastern Passage lies along the north-eastern coast of Australia and leads through Torres Strait. This passage is far the shortest, but it is rarely used by vessels sailing to India, on account of the numerous dangers to be encountered in the long and narrow strait between the rocky coasts of Australia and the numerous reefs of the Corallian Sea, though this part of the sea has been surveyed and laid down with great accuracy by Flinders. In the only season in which it could be navigated with advantage, that is during the north-west monsoon, the dangers are increased by frequent fogs of long continuance and by variable winds. The Outer Eastern Passage however is frequently used by vessels sailing from Sidney to India. In sailing along this track, a vessel after leaving Sidney runs eastward till it has passed to the east of the Corallian Sea; it then turns northward, leaving New Caledonia and the New Hebrides on the east, until it gets near the New Georgian Archipelago. It then sails along the southern borders of this archipelago, but at some distance from it, and passes through St. George's Channel between New Britain and New Ireland, whence it runs along the northern coasts of Papua and enters the Indian Sea either by Gallowa Strait between Papua and the small island of Sallawatty, or by Pitt's Strait between Sallawatty and Battante, another small island. Though this track is frequently taken by vessels bound from Sidney to the Indian Archipelago or Bengal, it is not used by vessels sailing in an opposite direction, which always prefer the Western Passage round Australia.

It has been already observed, that the current which sets northward through Behring's Strait prevents the ice of the Arctic Polar Sea from passing southward into the Kamtchatka Sea. It may be added, that the floating masses of ice of the Antarctic Polar Sea are frequently met with towards the American coast, but beyond the southerly current, between 50° and 60°, and between 140° and 200° W. long., and even north of 50°. Farther west, in the sea south of Australia, it is supposed that ice never passes beyond 60° S. lat.

(Cook's *Voyages*; Flinders's *Voyage to Terra Australis*; Basil Hall's *Extracts from a Journal written on the Coasts of Chile, &c.*; Kotzebue's *Voyage of Discovery*, and *Second Voyage round the World*; Krusenstern's *Voyage round the World*, and *Mémoires, &c.*: Beechey's *Voyage to the Pacific and Behring's Strait*; Fitzroy and Darwin, in *The Narrative of the Surveying Voyages of the Adventure and Beagle*; Humboldt's *Essai Politique sur la Nouvelle Espagne*; Meyen's *Reise um die Welt*; Krusenstern's *Atlas de l'Océan Pacifique*; Duperrey's *Carte du Mouvement des Eaux à la surface de la mer dans le Grand Océan*; Jeffery's and Roe's *General Chart of Terra Australis*; Berghaus's *Physikalischer Atlas.*)

PA'CIO, GIULIO, born in 1550, at Vicenza, in the Venetian state, learned Latin, Greek, and Hebrew at an early age, and became well acquainted with every branch of classical learning. Being accused before the ecclesiastical authorities of reading books forbidden by the church of Rome, he became alarmed, and escaped to Switzerland, where he earned his livelihood as a teacher. He was afterwards appointed professor of philosophy at Heidelberg, where he assumed the name of 'Pacius à Beriga,' from a country-house belonging to his family near Vicenza. He travelled through Germany and Hungary, and after some years he was invited by the duke of Bouillon to his newly established university of Sédan, where he taught philosophy with great success; but the civil wars raging in that part of the country, he removed to Nismes, and thence to Montpellier, where he was made professor of law in that university about the year 1600. The afterwards celebrated Peiresc was one of his disciples. Henri IV. bestowed on Pacius the honorary rank of king's counsellor. Pacius had long professed the reformed religion, and Peiresc earnestly but unsuccessfully attempted to induce him to settle near him at Aix, and to return to Catholicism. From Montpellier, Pacius removed to the university of Valence in Dauphiné, where his reputation as a jurist increased and spread throughout Europe. He was offered chairs at Leyden, Pisa, and Padua. He chose the last university, where he was received with great honours, and the Venetian senate made him a knight of St. Mark. After some time however he returned to his family, which he had left at Valence, where he died in 1635. A friend wrote the following distich for his monument:—

Itala dat cunas tellus, Germanica famam,
Gallica jus civis: dic mihi quæ patria?

Pacio wrote many treatises and commentaries on the Roman law; among others: 1, 'De Juris Methodo Libri Duo.' 2, 'Juris Civilis Romani Initia et Progressus,' consisting of a Commentary on the twelve Tables, of Notes on Fragments of Ulpian and Gaius, on Pomponius 'De Origine Juris,' and upon the last two titles of the Pandects. 3, 'Picturæ duæ de Gradibus secundum Jus Civile et Canonicum.' 4, 'De Contractibus.' 5, 'De Pactis et Transactionibus.' 6, 'In Decretales Libri V.' 7, 'Consuetudines Feudorum.' Pacius edited also the following works:—8, 'Corpus Juris Civilis cum Notis et Legum Argumentis,' fol., Geneva, 1580. 9, 'Justiniani Imperatoris Institutionum Libri IV.' 10, 'Sapientissimi Curopalatæ de Officialibus Palatii Constantinopolitani et Officiis Magnæ Ecclesiæ Libellus,' Greek and Latin, Heidelberg, 1589. He also published several editions of the 'Organon' of Aristotle, of which he made a new Latin translation. He also edited the works of Aristotle, in 2 vols. 8vo., 1597. His other works on various subjects are: 11, 'In Porphyrii Isagogen et Aristotelis Organum Commentarius analyticus,' 4to., Frankfort, 1597. 12, 'De Dominio Maris Hadriatici inter Serenissimum Regem Hispaniarum ob Regnum Neapolitanum et Serenissimam Rempublicam Venetam,' Lyons, 1619. In this curious work he defends with great skill the dominion asserted by the Venetian republic over the Adriatic Sea as far as Cape Leuca, on the several grounds of old prescription, of having its territories round the greater part of that gulf, on the obligation of keeping it free from pirates, and maintaining the only naval armament on its coasts. The work is interesting, as affecting other similar questions of 'mare clausum' and the rights of dominion claimed by other powers over the narrow seas near their coasts. 13, 'Doctrina Peripatetica.' 14, Lastly, after Pacio's death, was published at Amsterdam, in 1643, 'Posthumus Pacionus, seu Definitiones Juris utriusque.'

(Lorenzo Crasso, *Elogi di Uomini Letterati*; Thomasini, *Elogia Doctorum*; Gassendi, *Vita Peirescii.*)

PA'CLITES, De Montfort's name for a genus of *Belemnites*, composed of those species which are described as being curved towards the extremity, with a pore at the apex, and a straight elongated aperture. *Belemnites unguiatus* of De Blainville is an example.

PACTO'LIANS, the name by which M. Milne Edwards designates a tribe of the Apterurous family of the Anomurous section of crustaceans. The other tribes belonging to this family are the *Dromians*, the *Homolians*, the *Raninians*, the *Porcellanians*, the *Hippians*, and the *Pagurians*. (See these different tribes under the respective family titles or leading generic names, such as HIPPA; HIPPA TRIBE.) The *Pactolians* are placed by the author above named between the *Homolians* and the *Raninians*.

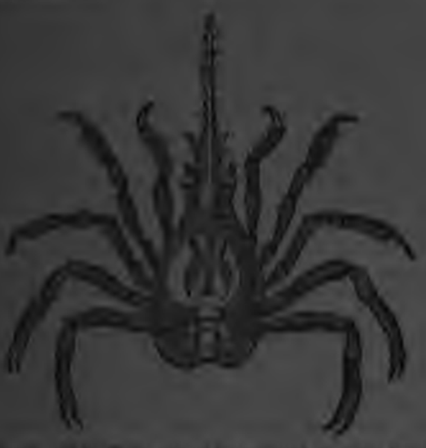
But it is not without some uncertainty that M. Milne Edwards gives such a position to the singular crustacean described by Dr. Leach under the name of *Pactolus*. In the conformation of the *carapace*, the *mouth*, and the *abdomen*, indeed, it resembles some of the *Oxyrhynchs*, but in the structure of its feet there are anomalies which distinguish it from other Decapods. The anterior feet are fingerless, whilst the two last pairs are terminated by a didactylous claw. Upon this form the family entirely depends, for no other genus, we believe we might add species, is known.

Pactolus.

Generic Character.—First joint of the *external antennæ* long and cylindrical. *Feet* moderately long and rather stout, the two anterior shorter than the others, not terminated by a *manus* or pincers, but only provided with a simple hooked nail; the second pair terminated in the same way; the third pair unknown; fourth and fifth pair didactylous. *Carapace* triangular, elongated, rather convex on each side behind, not thorny above, and terminated anteriorly by a very long, sharp, delicate and entire rostrum, similar to that of the *Leptopodiæ*. [MACROPODIANS, vol. XIV., p. 233.] *Abdomen* of the female composed of five joints, the first narrow, the three following transverse and linear, and the fifth very large and nearly rounded. *Eyes* very large, situ-

and behind the antennæ, always projecting from them; a single spine behind each orbit.

Example, *Pactolus Boscii*. Length eight lines, nearly two of which belong to the rostrum, which is furnished with small spines directed obliquely on the sides; carapace smooth, brownish; feet variegated with reddish and whitish. Country unknown.



Pactolus Boscii. [illegible]

PACTOLUS. [Lydia.]

PACU'VIUS, MARCUS, a native of Brundusium, a Latin dramatic poet, and the nephew of Ennius, also distinguished himself as a painter. He was born about 219 B.C. Pliny (*Hist. Nat.*, xxxv. 4, 7) mentions some works executed by him in the temple of Hercules, in the Forum Boarium at Rome, which apparently did him considerable credit; he remarks at the same time that he was the last who painted with *honest hands* ('honestis manibus'), with the exception perhaps of Turpilius Labeo of Verona, a Roman knight of his own time.

Some fragments of the tragedies of Pacuvius are still extant, and according to Quintilian (*Inst. Or.*, x. 1) they were not without their merits. He died at Tarentum in the 90th year of his age. He wrote a simple epitaph upon himself, which has been preserved by Aulus Gellius (i. 24): 'Adolescens, tametsi properas, te hoc saxum rogat, uti ad se aspicias, deinde quod scriptum est legas. Hic sunt poetæ Pacuvii Marci sita ossa. Hoc volebam nescius ne esses: vale.' The fragments of Pacuvius were collected by Henry Stephens, Paris, 1564, 8vo., and have since been printed in several editions of the 'Corpus Poetarum Latinorum.' Cicero, in his treatise 'On Friendship' (c. 7), introduces Lælius as speaking in terms of commendation of the 'Orestes' of his friend Pacuvius. Pacuvius was fifty years older than Attius, who exhibited a play in his thirtieth year, at the same time that Pacuvius, then in his eightieth year, exhibited one. (*Cic., Brut.*, c. 64.)

PADANG. [Sumatra.]

PADDINGTON. [London.]

PADDY BIRD. [Rice Bird.]

PADERBORN, formerly a bishopric of the German empire, in the *circle* of Westphalia, was assigned to Prussia in 1802; it is now divided among the three governments which form the Prussian province of Westphalia; the portion still called Paderborn is a circle of the government of Minden. It is bounded by some offsets of the Egge Mountains, but on the whole it is level, and has extensive heaths and marshes. The soil is fertile, but does not produce sufficient corn for the home consumption. Much hemp is grown; the forests are considerable; the inhabitants breed great numbers of sheep and swine; the mineral products are coals, iron, and salt.

PADERBORN, the capital of the circle, in 51° 43′ N. lat. and 8° 45′ E. long., is situated on the river Pader, from which it has its name, signifying 'the source of the Pader.' This river is formed by five springs that rise under the cathedral and the adjacent houses. It is surrounded with walls and has five gates. The houses of Paderborn are tolerably well built, but the streets are narrow and dark. It is said to have been for a time the residence of Charlemagne, who founded the bishopric. The building of the cathedral was begun in the year 777; it was destroyed by fire in 1000. A new cathedral was completed in 1015, but the chapel of St. Bartholomew is the only part of it that remains. The present cathedral was built in the twelfth and fourteenth centuries, and underwent many changes in the fifteenth, sixteenth, and seventeenth centuries. The steeple was destroyed by lightning in 1615. The cathedral contains the remains of St. Liborius (which were brought from France in 836) in a coffin of silver gilt. It formerly possessed, besides other treasures, the golden images of the twelve apostles, which Duke Christian of Brunswick, who took the city in 1622, carried away with him, as well as the silver coffin, which at that time contained the body of the saint, and which he coined into dollars, with the legend, 'The friend of God and the enemy of the priests.' There are three other Roman Catholic churches and one Protestant church, a seminary for priests, a Catholic gymnasium, a Jewish school, and numerous useful and charitable institutions. It is still the see of a bishop and chapter. The university, founded in 1622, was abolished in 1819, and the funds applied to the gymnasia at Paderborn and Münster.

Paderborn was one of the Hanse towns, and a free imperial city, but became subject to the bishop and chapter, and the capital of the bishopric. The inhabitants, 8000 in number, have no manufactures of importance, but extensive breweries and distilleries, and a considerable inland trade.

PADILLA, JUAN LOPEZ DE, the leader of a popular insurrection in Castile against the ministers of Charles V., known as *La Guerra de las Comunidades*, was the son of Pedro Lopez, a nobleman who held the high office of *Adelantado Mayor* of that kingdom. After the death of Ferdinand V. (1516), the crown of Aragon and Castile, together with the extensive possessions dependent on them in Europe, as well as in Africa and America, devolved upon his grandson Charles, then in his sixteenth year. [Charles V.] The young prince appointed Adrian of Utrecht to administer the kingdom in his absence, but such was the aversion of the Spaniards to the government of a stranger, that Adrian's claim would at once have been rejected, had not the celebrated Cardinal Ximenez [Cisneros] consented to acknowledge him as regent, and carry on the government in conjunction with him. However, Adrian and his Flemish associates in the administration soon rendered themselves exceedingly obnoxious by their utter incapacity, their corruption, and their griping avarice. The laws of the kingdom were completely disregarded, the high offices of the state either given to foreigners or sold to the highest bidder; and the revenue of Spain, instead of being spent at home, found its way into Germany: the sovereign himself, who was far from his natural dominions, was a candidate for the imperial throne, then vacant by the death of his grandfather Maximilian. All these causes of discontent, increased by Charles's disregard to the remonstrances sent him by the Cortes, spread widely through the Peninsula. The city of Toledo was the first to show symptoms of rebellion. On the arrival of Charles at Valladolid for the purpose of receiving from the Cortes assembled there the oath of allegiance as heir to the crown of Castile, the deputies of Toledo were entrusted by their constituents with a lengthy memorial containing their grievances. Though Charles did not openly deny their petition, he referred them to the Cortes about to be assembled at Santiago, and quitted Spain to take possession of the Imperial crown.

When the people of Toledo heard that the deputies assembled in Galicia had voted the emperor a free gift without obtaining redress of any of their grievances, they rose tumultuously in arms. Their first act was to seize upon the Alcazar, a royal palace and fortress on an eminence commanding Toledo, and after appointing Padilla to be their leader, to establish a popular form of government. Segovia, Toro, Salamanca, Murcia, and Avila followed the example. A general meeting was convened at Avila, and a solemn league formed for the mutual defence of their rights, the direction of affairs being entrusted to a council composed of the deputies of all the towns, under the name of *Junta de las Comunidades*. In the meanwhile Adrian, who resided at Valladolid, then the capital of Spain, sent a body of troops under Ronquillo, to chastise the rebels; but while he was besieging Segovia, Padilla, with a body of insurgents from Toledo, came to the assistance of the citizens, and defeated the royal troops. The next step of Padilla was to march upon Tordesillas, the place where queen Joanna, Charles V.'s mother, had resided since the death of her husband. Being admitted to the presence of the princess, who had long been in a state of mental debility, Padilla and his followers renounced the authority of the regent, and placed her at the head of the government. From thence they proceeded to Valladolid, and deposing Adrian, seized upon the archives and the seals of the kingdom. The Junta then drew up a lengthy remonstrance, containing a state of their grievances, and sent with it two of their number to the emperor. Everything now augured success to the cause of popular liberty, but dissension soon broke out in the ranks of its supporters. The Junta, relying on the unanimity with which the nation had submitted to their authority, and seeing no royalist forces on the field to obstruct their designs, began seriously to think of reforming several political abuses, and various measures were proposed and carried, which struck no less at the privileges of the nobles than at the prerogatives of the crown. This produced a union of the nobility with the royalists. The Junta, who now became jealous of Padilla's popularity, deprived him of the command of their forces, and appointed Don Pedro Giron, the eldest son of the Conde de Ureña, a nobleman of high rank, but wholly unequal to the task entrusted to him.

In December, 1520, the royalists, under the Conde de Haro, defeated the popular army, attacked and took Tordesillas, released queen Joanna, and regained possession of the archives and seals of the kingdom, besides making fourteen members of the Junta prisoners. This severe blow was followed by the immediate disbandment of the insurgents and the loss of their general, who, betraying the cause of the people, passed over to the royalists. Padilla was now raised to the command of the army. He was at first successful in various small encounters, and by means of skilful manœuvres succeeded in avoiding a general engagement with the veteran troops of Charles; but at length the royalists closing upon him on all sides, he was obliged to hazard a battle, in which he was completely defeated at Villalar, 23rd of April, 1521.

Padilla, who had been severely wounded in the conflict, was made prisoner, together with some of his principal officers, and executed on the day following that on which the battle was fought. Sandoval, and after him Dr. Robertson, have preserved us two letters, full of eloquence and manly feeling, which the illustrious martyr of liberty wrote a few hours previous to his execution; one addressed to the city of Toledo, the other to his wife Doña Maria Pacheco, in which are some remarkable passages breathing respect and filial love towards his father Pedro Lopez, who fought against him under the royal banners.

PADILLA, DOÑA MARIA PACHECO DE, the offspring of one of the most illustrious families in Spain, was early married to John of Padilla, whose political principles she embraced, and whose cause she most strenuously defended. After the execution of her husband, she swore to support the sinking cause of the people, and to revenge his fate. The citizens of Toledo, who had learned on former occasions to appreciate her virtues, entrusted her with the defence of their rights. The prudence and vigour with which she acted justified the confidence placed in her. She wrote to the general of the French, who had just invaded Navarre, to advance into Castile, promising him her powerful aid. In order to procure the money requisite for raising an army, she went in person to the cathedral of Toledo, where a vast treasure of ecclesiastical wealth was preserved; and entering the temple in solemn procession with all the marks of the deepest sorrow on her countenance, proceeded to take possession of the sacred deposit. She moreover adroitly put into practice every artifice that could interest or inflame the populace. For this purpose she ordered her troops to use crucifixes instead of crosses, and she marched through the streets with her son, a young child, dressed in the deepest mourning, seated on a mule, and having a standard carried before him, on which was represented his father's execution. All her efforts were however fruitless: the rebellion, now confined almost within the walls of Toledo, was speedily crushed in other parts of the Peninsula. By the total discomfiture of the French, who were obliged to repass the Pyrenees in haste, all the royalist forces were brought into operation; and Toledo, the last refuge of the Comuneros, was invested. Though she defended herself with the greatest courage for four months within the walls of the citadel, the clergy, whom she had highly offended by her spoliations, ceasing to give her their support, she was obliged to surrender that fortress. It appears however that the means were facilitated to her of making her escape; for she fled to Portugal, where she passed the remainder of her days. Thus ended this bold though unsuccessful attempt of the commons to assert their rights, which contributed greatly to increase and extend the power of the crown. With the exception of the graphic and admirable sketch by Dr. Robertson, in his 'History of Charles V.,' we possess no other history of these important events but what has been preserved by the Spanish writers, who are all in favour of the rights of the crown. There are in the library of the British Museum two inedited manuscripts containing an account of these wars, which were unknown to Dr. Robertson. Martinez de la Rosa is the author of a tragedy entitled 'Maria de Padilla.'

(*Relacion de las Comunidades, MS. Bib. Egerton*, in the British Museum, No. 303; *Tratado de las Comunidades*, ib., No. 310; Robertson's *Charles V.*, vol. ii (sixth edit.); Sandoval, *Hist. de Carlos V.*; Martinez de la Rosa, *Bosquejo de la Guerra de las Comunidades*, vol. iii.)

PADILLA, LORENZO DE, one of the historiographers to Charles V., was born at Antequera, a town of Andalusia, towards the end of the fifteenth century. When still young he was, owing to his eminent virtues and profound learning, raised to the dignity of archdeacon of Ronda in the diocese of Malaga. At the same time he was appointed historiographer to the crown, when he devoted his time entirely to the study of the antiquities and history of his native country. Padilla died in 1540, leaving behind him a general history of Spain, divided into four parts, a few sheets of which have been printed, according to Nicolas Antonio (*Bib. Nov.*, vol. ii.), a circumstance which proves that the whole work was committed to the press, though the impression was probably never completed. The original manuscript was still existing at the end of the last century in the library of the convent of St. Paul at Cordova, but has since disappeared. Florian de Ocampo, Padilla's successor in office, has been accused of appropriating to himself a voluminous treatise of this writer on the antient geography of Spain, which he inserted almost entire in the first books of his 'Cronica General de España.' Besides the above works, Padilla wrote the following: 'Catalogo de los Santos de España,' Toledo, 1598, fol.; and 'Libro de las Antiguedades de España,' afterwards edited by Pellicer, Valencia, 1669, 12mo. The following are still inedited:—1, 'Geografia de España;' 2, 'Nobiliario o Linages de España;' 3, 'Origen y Sucesion de los Principes de la Casa de Austria hasta el Rey Don Felipe;' 4, 'Catalogo de los Arzobispos de Toledo.'

(Nicolaus Antonius, *Bib. Nov. Script. Hisp.*, vol. ii., p. 6.)

PADOLLUS, De Montfort's name for those species of the genus *Haliotis* which are distinguished by a large parallel rib hollowed interiorly, &c. [HALIOTIDÆ, vol. xii., p. 16.]

PA'DOVA, THE PROVINCE OF, called by the English *Padua*, one of the provinces of the Lombardo-Venetian kingdom, is bounded on the north by the province of Treviso, on the east by that of Venice, on the south by that of Rovigo, and on the west by the provinces of Vicenza and Verona. The province of Padua consists almost entirely of a plain crossed by the rivers Brenta, Bacchiglione, Gorzone, and others, and sloping to the eastward towards the lagoons of Venice. The Adige forms the southern boundary of the province, and divides it from that of Rovigo. A small part of the territory, about one-twentieth, is occupied by a range of hills called the Euganean Hills, which are of volcanic formation and well cultivated; they run south-west of the city of Padua, and divide the waters of the Bacchiglione from those of the Adige. The length of the province is about 40 miles from north to south, and its greatest breadth is about 30 miles, but in other places it does not exceed 15 miles. The area is reckoned at 836 square miles. (Quadri, *Prospetto Statistico delle provincie Venete.*) The province of Padova is the most fertile and the most densely peopled of the Venetian provinces which now form part of Austrian Italy. The population in 1833 was estimated at 284,000 inhabitants. (Serristori, *Saggio Statistico dell' Italia.*) The province is divided into twelve districts, namely, Padova, Monselice, Montagnana, Este, Mirano, Noale, Camposampiero, Piazzola, Teolo, Battaglia, Conselve, and Piove, which contain in all 103 communes. A number of canals, some for navigation and others for irrigation, intersect the province, which produces wheat, Indian corn, pulse, oil, wine, flax, hemp, chesnuts, potatoes, fruits, and hay. The number of horned cattle is reckoned at about 46,912 head, that of horses at 8000, sheep 52,000, and swine 20,000. The other products of the country are silk, wool, wax, and honey. The manufactories are few, and consist chiefly of tanneries, silk spinneries, woollen cloth, and hats. The city of Padova has several presses for printing and engraving.

The principal towns are the following: PADOVA; Este, a town of about 8000 inhabitants, has given name to an illustrious sovereign family; Montagnana, with about 8000 inhabitants, has some tanneries and hat-manufactories; Abano, with 2000 inhabitants, is noted for its mineral waters and mud, of which Stewart Rose gives a description in his 'Letters from the North of Italy;' Battaglia is also frequented for its mineral springs. Near Battaglia are the fine mansion and grounds called 'Il Catajo,' which belonged to the noble family of Obizzi, the last of whom bequeathed it to the present duke of Modena. A few miles from it is the village of Arquà, in a delightful situation on the Euganean Hills. Arquà contains the house in which Petrarch breathed his last:

> They keep his dust in Arquà, where he died;
> The mountain-village where his latter days
> Went down the vale of years; and 'tis their pride—
> An honest pride—and let it be their praise,
> To offer to the passing stranger's gaze
> His mansion and his sepulchre; both plain
> And venerably simple, such as raise
> A feeling more accordant with his strain
> Than if a pyramid form'd his monumental fane.'
>
> 'Childe Harold,' canto iv.

PADOVA, in English *Padua*, the antient Patavium, a town of the Veneti, known as the birth-place of the historian Livy, and now a town of the Lombardo-Venetian kingdom, is situated in a fertile plain, in 45° 25′ N. lat. and 11° 53′ E. long. The river Bacchiglione flows by its walls. Padova is enclosed with walls, ditches, and bastions, and is above six miles in circumference; but it is thinly inhabited, the population not exceeding 47,000 inhabitants (Serristori, *Saggio Statistico*), though it has been increasing of late years. Most of the streets, especially in the old part of the town, are narrow and lined with arcades; it has however some fine squares and handsome gates. The principal buildings are: 1, the cathedral, begun in the twelfth century, but finished only about the middle of the eighteenth; it has some good paintings and several sepulchral monuments of learned men, among others that of Sperone Speroni, a philosopher, orator, and poet of the sixteenth century; and a bust of Petrarch. The baptistery, which is detached from the church, has some fine old paintings of the Florentine school. 2, The episcopal palace has also some valuable paintings, among others a bust of Petrarch in fresco, which was cut out of the wall of the poet's house, and is considered the best likeness of him. 3, The church of St. Anthony, built by Nicola di Pisa; it is very rich in paintings, sculpture, and other ornaments, besides containing many sepulchral monuments of illustrious men, such as Bembo, the patrician Cornaro, Cesarotti, and others. The chapel of the titular saint is one of the richest in the world; its treasury, consisting of numerous offerings made by the pious, was partly stripped of its riches by the French in 1797. St. Anthony is the patron saint of Padova, and his church is one of the most splendid in Italy. In the square before the church is a fine bronze equestrian statue of Gattamelata, captain-general of the Venetian troops, by Donatello. 3, The church of Santa Giustina, a handsome piece of architecture, with eight domes and numerous chapels and paintings; its antient and valuable library was sold in 1810 by Napoleon's government, and the books and MSS. have been dispersed all over Europe. 4, The church of the Eremitani, built in the thirteenth century, contains several remarkable old fresco paintings, and some sepulchral monuments of the family of Carrara, once the rulers of Padua. Padova has many other churches, most of which are worthy of notice. That of Santa Croce deserves mention for the tomb of Father Stellini, a man of vast and multifarious erudition, a poet, mathematician, and metaphysician, one of the profoundest thinkers that Italy has produced, and yet he is now nearly forgotten in his own country. 5, The building of the university, called the palace, is large and commodious, having a court, with two ranges of galleries one above the other, an anatomical theatre, a cabinet of natural history begun by Vallisneri, a botanical garden, an observatory, and a library with upwards of 70,000 volumes. There are several colleges in various parts of the town. The university, which is one of the principal in Italy, was founded by the emperor Frederic II. in the first part of the thirteenth century. It flourished most after Padua came under the dominion of Venice, when it had six thousand members. The number of students is now about one thousand. There are about sixty professors, several of whom are well known in the scientific world. A rector, annually chosen from the body of professors, is at the head of the university. The university has four faculties, theology, law, medicine, and philosophy. 6, The clerical college or seminary of Padua is noted for its printing-presses, which have long supplied Italy with school books, and with good editions of other works. At Padua Forcellini compiled and published his great Latin Lexicon, upon which he spent forty years of his life. The library of the seminary contains 55,000 printed volumes and about 800 MSS. 7, The palace of justice, 'palazzo della ragione,' or town-house, is a vast structure: the great hall, the largest in Europe, is nearly 300 feet long, 100 feet wide, and 100 feet high; it is ornamented with frescoes and with monuments of illustrious Paduans, among others one raised in honour of Livy, and another to Belzoni, with two Egyptian statues of granite given by that traveller to his native city. At one end of the hall is the 'lapis vituperii' mentioned by Addison; it is a seat of black stone upon which insolvent debtors were obliged to sit with their bare posteriors, as in other towns of Italy, in the middle ages. 8, The palace called 'del Capitanio,' once the residence of the Carrara family, is remarkable for its handsome gate, its great court, and its tower. The town library is in one of the halls of this palace. 9, The palace Giustiniani is remarkable for its fine architecture among the other palaces of the Paduan nobility. 10, The new building, called the 'Caffè Pedrocchi,' is both a coffee-house and casino or assembly-rooms; it is entirely cased externally and internally with marble, and is one of the most splendid establishments of the kind in Europe.

The Prato della Valle, or public promenade, is adorned with numerous statues of distinguished Italians. The academy of sciences, letters, and arts of Padova, instituted in 1779, publishes its memoirs, which form nine or ten volumes 4to. Besides the learned men to whom Padova has given birth, Petrarch resided here a long time, holding a canonry in the cathedral, and he died at Arqua, a few miles distant; and Galileo was for eighteen years professor in the university.

Patavium was considered in the Roman times as one of the oldest towns of Italy, and there was a tradition of its having been founded by the Trojan Antenor. Patavium was long in alliance with Rome, and had its own magistrates. At the fall of the Roman empire, it was destroyed by Attila, and the inhabitants removed to the islands in the lagoons, where they founded Venice. Patavium was rebuilt by Narses, ravaged by the Longobards, and restored by Charlemagne. It afterwards governed itself for a long time as a free municipality with its consuls and podestas. In the thirteenth century Ezzelino da Romano usurped the sovereign power, but after his death the Paduans not only regained their freedom, but extended their authority over several adjacent provinces. Soon after the Carrara became lords of Padova, until 1406, when Venice took it by force and united it to its territory, and caused its last lord Francesco Carrara and his two sons to be strangled in prison. Numerous writers have written on the history and monuments of Padova: among the rest, Scardeonius, 'De Antiquitate Urbis Patavii et claris Civibus Patavinis,' fol., 1560; Gennari, 'Annali della Città di Padova,' 3 vols. 4to., 1804; Facciolati, 'Fasti Gymnasii Patavini,' 2 vols. 4to., 1757; Moschini, 'Guida per la Città di Padova,' 1817; Federici, 'Dissertazione Storica della Biblioteca di Santa Giustina in Padova,' 1815.

PADOVANI'NO. [VAROTARI.]

PADRIES. [SUMATRA.]

PADSTOW. [CORNWALL.]

PADUA. [PADOVA.]

PADUANI'NO, FRANCESCO, was born in the year 1502. The name of the master under whom he studied seems not to be known. Judging by his works, he must have acquired his knowledge of the art in a good school. He was an artist of eminent talents. His historical pictures prove his abilities and taste. His invention was fertile and refined, and his drawing correct and elegant. In the church of the Madonna dei Carmini at Venice there was (and perhaps still is, but we cannot positively say) a picture by this master representing the deliverance of two persons condemned to death, by the interposition of a saint. It is a beautiful performance: the colouring is good, the figures elegant, and the pencilling remarkably tender and delicate. As a painter of portraits he was equal to the greatest masters in that branch of the art. There was such dignity, expression, and beautiful colouring in them, as to gain universal admiration. His portraits of the Earl and Countess of Arundel are spoken of as decisive proofs of his merit. He died in 1617, at the age of sixty-five, leaving a son, Octavio, who studied first under his father, and afterwards for several years at Rome. He painted in the same style as his father, but was inferior to him in invention. His chief excellence was as a portrait painter. He died at the age of fifty-two, but in what year is uncertain.

PÆAN (*παιάν, παιών*, Ionic *παιήων*), a hymn which was originally sung in honour of Apollo, obtained its name from that of the god to whose honour it was sung. In Homer, Pæan (*παιήων*) is spoken of as a separate individual and the physician of Olympus (*Il.*, v. 401, 899; compare Pind., *Pyth*, iv. 481); but there appear sufficient reasons for supposing that this god is the same as Apollo. The pæan was sung at all the solemn festivals of Apollo, as for instance at the Hyacinthia (Xen., *Ag.*, ii. 17). The pæan was a loud and joyous song, and was therefore sung at the cessation of a plague (*Il.*, i. 473) and after a victory. It was also sung by the Greek troops previous to an engagement (Xen., *Anab.*, i. 10, s. 7, &c.), and was called by the Spartans on that occasion *παιὰν ἐμβατήριος* (Plut., *Lyc.*, c. 22). The Scholiast on Thucydides (quoted by Sturtz, *Lex. Xenoph.*, vol. iii., p. 384) says, that the pæan which was sung before a battle was sacred to Ares, and the one sung after to Apollo; but whether this be the case or not, it is certain that the pæan was sung in honour of other gods as well as of Apollo. Xenophon, for instance, relates that the Lacedæmonians on one occasion, after an earthquake, sung a pæan to Poseidon (*Hell.*, iv. 7, s. 4), and also that the Greek army in Asia sung a pæan to Zeus (*Anab.*, iii. 2, s. 9). It was also the custom to sing a pæan after an entertainment. (Xen., *Symp.*, ii. 1; Athenæus, iv. 27, p. 179. Compare Müller's *Dorians*, vol. i., p. 319, 320, 337, 384, transl.)

PÆCILOPODA, erroneously printed as a reference from Cecrops for Pœcilopoda.

PÆDO-BAPTISTS (those who baptise children, from *παῖς* and *βαπτίζω*), a term used by modern theological writers, not as the designation of any particular body of Christians, but for the sake of distinguishing all those, of whatever sect, who practise infant baptism, from the body who are called Baptists. [Baptists.]

PÆO'NIA. [Macedonia.]

PÆO'NIA is a genus chiefly of European and Asiatic plants, belonging to the natural order Ranunculaceæ, and very generally cultivated in gardens for the sake of their large gaudy flowers. They are characterised in their order by a permanent leafy calyx of 5 unequal sepals, 5 petals, stamens whose anthers split open by two fissures along their face, a fleshy elevated disk, and from 2 to 5 many-seeded carpels, terminated by a fleshy recurved stigma. Their fruit consists of leathery follicles, splitting on one side, and exposing to view a number of round, black, shining seeds adhering to a crimson placenta.

One species, *P. Moutan*, a native of China, is a shrub, of which several varieties, with beautiful whitish flowers stained with pink, are now in our gardens. Of these the most showy is that called *P. papaveracea*, which has a broad crimson stain at the base of each petal. If grown on the north side of a wall, or in a situation where it is but little exposed to the sun in the early part of the day, this species will bear the open air of England without protection; but it sprouts so early in the spring, if exposed to the sun, that it is very liable to be cut off by the late frosts of England. Of the other species, *P. Brownii* and *californica* are remarkable for being the only species inhabiting America; they are natives of California and of the country to the northward, and have little beauty: the first exists in our gardens, but is extremely rare. The rest of the genus consists entirely of European and Asiatic plants, which, according to De Candolle, form fifteen species; but there can be no doubt that the greater part of these supposed species are mere varieties, chiefly of *P. officinalis*, *albiflora*, *tenuifolia*, and *peregrina*.

All these plants are liable to produce double flowers, which, by the conversion of their numerous stamens into petals, are generally extremely beautiful: they have however no smell, or not an agreeable one. Being quite hardy, growing readily in any kind of soil, and easily multiplied, either by seeds or by division of the roots, they are generally favourites in gardens.

All the species have an acrid principle concentrated in their roots and seeds, which are accordingly emetic and cathartic in moderate doses. They were formerly in great repute as a medicine; and Dioscorides, whose *Παιωνία* was probably both *P. officinalis* and *peregrina*, gives no fewer than sixteen names by which it was known.

PAER, FERDINANDO, was born at Parma, in 1774 according to his own account, and received his first instructions in music at the Conservatorio della Pietà, in his native city. It is stated that he produced an opera, *Circe*, at Venice, when he was only ten years of age, and that this was successful; but to relations of so marvellous a kind we are slow in giving credit. Either the composer was older than is supposed when his first essay was performed (which we believe to be the case), or the opera must have been a mere sketch by the child, reduced to order and filled up by an experienced musician. After remaining some years at Venice, he visited all the great cities of Italy; then returning to the place of his birth, the grand-duke, his godfather, settled on him a pension, which, putting him in a state of independence, enabled him to gratify an ardent desire to study the various branches of polite literature, poetry in particular, and to this may be ascribed that judgment in setting words to music which is so conspicuous in all his compositions.

In 1795 Paer accepted an invitation to Vienna, where he produced three or four operas, and also some cantatas for the empress Theresa. In 1801 he succeeded Naumann as *kapellmeister* at Dresden, and there brought out his *Leonora* and *I Fuorusciti*. Here he was introduced to Napoleon after the battle of Jena, and thenceforward was taken into the emperor's service, whom he attended to Posen and Warsaw, and afterwards to Paris, where he was appointed Imperial composer and conductor of the chamber music of the empress Marie-Louise, The favour he had enjoyed at the court of the Tuilleries was not discontinued on the restoration of the Bourbons, by whom he was noticed in a marked manner. In 1818 he undertook the direction of the Opéra Italien, which office he held till the year 1825, when, from alleged motives of economy, but in fact through theatrical intrigue, he was superseded. The mortification produced by this dismissal was in some degree alleviated by his election as a member of the Institute; but the treatment he had received visibly affected him till his death, which took place at Paris in 1839.

Among the many operas by Paer, his *Agnese*, *Griselda*, *Achille*, and *Sargino*, give him a title to be ranked among the first masters of the age; and all his other works exhibit skill in design, excellent dramatic arrangement, and masterly accompaniments. He knew how to turn his materials to the best advantage, and to a considerable share of genius added that superior taste which is the result of strong natural sense and feeling properly cultivated and directed.

PÆSTUM, POSEIDO'NIA, an antient town of Lucania, about four miles south-east of the mouth of the Silarus, near the coast of the Gulf of Pæstum, now the Gulf of Salerno. The surrounding country, which is low and marshy, lies between the sea and an offset of Mount Alburnus, which divides it from the valley of the Calore, an affluent of the Silarus. The sulphureous springs which are in the neighbourhood form stagnant pools, and a stream, noticed by Strabo, and now called Fiume Salso, which flows past the walls of Pæstum, by overflowing the low grounds adds to the unwholesomeness of the atmosphere. The whole lowland is deserted, and the only villages are on the hills. The remains of Pæstum are about twenty-five miles south-south-east of the town of Salerno; they consist of the town walls, two fine Doric temples, another building, and a small amphitheatre. Remains of a Roman temple are said by Valéry (*Voyages en Italie*) to have been discovered in 1830, between the two older temples, but they are probably the same as those already noticed by Swinburne in 1783 as being then in a very dilapidated state.

The origin of Pæstum is involved in obscurity. According to Solinus it was a colony of the Dorians, but others pretend, though apparently without any authentic grounds, that it was first a Phœnician settlement, and was afterwards colonised by the Dorians. (Mazocchi, *Commentarii in Tabulas Heracleenses*.) Others again ascribe its foundation to as Tyrrhenian Pelasgi, and the peculiarly massive construction of the walls seems to correspond with the character of the other structures attributed to that people. Medals with Etruscan characters have been found at Pæstum, in which the town is called Phistlus, Pistlu, and also Sistlus. (Hamilton, *Antiquities*, vol. i., 95-96; Paoli, *Dissertationes*.) Whoever were the founders, there is reason to believe that Pæstum existed as a town before it was colonized by the Sybarites, according to Strabo and others. Sybaris was not a Dorian colony, but it is stated by Aristotle (*Politics*, v. 3) that a band of Trœzenians had a share in its foundation together with the Achæans, and that being driven away by the latter, they went to found a new settlement in another part of the country. These Trœzenians are supposed by some to have been the colony that occupied Pæstum, and gave it the name of Posidonia, or the city of Poseidon. (Raoul Rochette, *Histoire des Colonies Grecques*.) Herodotus (i. 167) says that the Phocæans (who had fled away from Asia Minor in the time of Cyrus) landed on the coast of Œnotria and founded Hyela, having for leader a man from Posidonia. The site of Hyela, afterwards called Elea and Velia, and of which no traces remain, was to the south-east of Pæstum, beyond the river Heles, now Alento.

The medals of Posidonia shew by their devices, which consist of anchors, oars, rudders, and other nautical implements, that the inhabitants were a seafaring people. Strabo says that the Lucanians took Posidonia from the Sybarites, and the Romans afterwards took it from the Lucanians, and it must have been under them that the inhabitants lost by degrees their Greek manners and refinement, a circumstance which we find deplored by Aristoxenus of Tarentum (Athenæus, xiv. 7); and this is confirmed by Strabo (vi. 253), who says that, with the exception of Neapolis, Tarentum, and Rhegium, all other Greek towns in Southern Italy had become barbarised, being occupied, some by the Lucanians, others by the Campanians, though all in reality under the dominion of Rome. Livy places under the year 422 of Rome a battle fought in the neighbourhood of Pæstum by Alexander king of Epirus against the Samnites and Lucanians united, who were defeated. Half a century later, at the end of the war against Pyrrhus, the Romans are stated to have sent colonies to Posidonia and Cosa. (Livy, *Epitome*, xiv.) Livy afterwards (xxii. 36, and xxvi. 39) speaks of Pæstum as of a town allied to Rome, and willingly assisting Rome, like its neighbours of Velia and Neapolis, in the great contest against Hannibal; and in another place (xxvii. 10) Pæstum is numbered among the eighteen faithful Latin colonies which did not forsake Rome in the time of danger. Strabo (v. 251) observes that 'the country between the Samnites and Campanians and the Tyrrhenian Sea as far as the Frentani, was inhabited by the *Picentini*, a colony of the Piceni from the Adriatic coast, who had been forcibly removed by the Romans to the shores of the Posidonian or Neptunian Gulf, now called Pæstan, the town of Posidonia being named *Pæstum*.' In two inscriptions of the Roman time existing at Naples, Pæstum is styled a municipium. Nothing is known of it under the empire, but the surrounding country is celebrated by Virgil, Ovid, and other Roman poets, for the abundance and luxuriance of its roses, and the 'Pæstanæ valles' are extolled for their fertility, a quality which they have retained to this day. The country south-east of Pæstum as far as *Capo Palinuro* is one of the finest districts in the kingdom of Naples, and is known by the name of 'Il Cilento,' from the river Alento, which flows through it.

Bishops of Pæstum are mentioned in the annals of the church in the fifth century of our æra. A bishop named Florentius attended the council of Rome under pope Symmachus, A.D. 499. In the tenth century, the Saracens, having invaded this part of the country, formed a settlement at Agropoli, in the neighbourhood of Pæstum, where they fortified themselves, and long resisted all the efforts of the dukes of Beneventum and the Greeks to expel them. That was the period in which they devastated Beneventum, Sora, Matera, and other towns; and it seems that Pæstum was ruined about the same time, and the episcopal see was removed to Capaccio on the neighbouring mountain. In the following century, after the expulsion of the Saracens, king Roger the Norman ransacked the temples and other monuments of Pæstum of their marble and other ornaments, to adorn the cathedral which he raised at Salerno.

During the middle ages the remains of Pæstum lay unnoticed, though not unknown, as some people have gratuitously stated, for the temples are conspicuous objects from almost every part of the Gulf of Salerno, and there is nothing between them and the sea to obstruct the view. But the truth is that the natives were careless of those things, and the country having become unwholesome and infested by outlaws, strangers did not venture into it. When Don Carlos Bourbon, having conquered Naples towards the middle of the last century, became the resident sovereign, he revived the taste for the arts and antiquities. Count Felice Gazola of Piacenza, an officer in his service, having been appointed commandant-general of artillery, had occasion to visit that coast, and being himself a man of taste, he admired the temples and other remains in that solitary region, and took drawings of them, with the intention of having them published; but king Charles having removed to Madrid, Gazola followed him thither. Mazocchi, in 1754, in his work on the Heraclean Tables, inserted a dissertation on Pæstum and its history, and mentioned Count Gazola as having again brought to notice the remains of that once illustrious city. Winkelmann, who visited Pæstum in 1758, has made some remarks on the temples in his introduction to his 'Anmerkungen über die Baukunst der Alten.' About the same time Pasquale Magnoni wrote a work entitled 'De veris Posidoniæ et Pæsti originibus Dissertatio,' without date. In 1767 appeared in London the first description of Pæstum, 'The Ruins of Pæstum,' fol., with 8 plates, anonymous, which was followed by Major's work, which had the same title, in 1768. In 1769 a French translation of the former work, in 4to., with plates, was published at Paris, and in the preface to this translation the plates were said to be derived from drawings taken on the spot by a French artist named Soufflot, as early as 1750, and some of which had been engraved and published at Paris, by M. Dumont, in 1764. As the plates however of these works, according to Father Antonio Paoli, were incorrect, except those that were borrowed from Gazola's drawings, which he had shown to some friends, Gazola commissioned some persons at Naples, among others Father Antonio Paoli, to compare his drawings with the originals, and prepare them for publication. Gazola having died in Spain in 1780, Paoli became the depositary of his papers, from which he published his fine work, 'Pæstanæ Dissertationes,' Italian and Latin, with sixty-three plates, thirteen of which are of Posidonian coins, and a topographical map, fol., Rome, 1784. Delagardette's 'Ruines de Pæstum' was published at Paris in 1797. The 'Magna Græcia' of Wilkins also contains descriptions and architectural drawings of the temples.

PÆSTUM, ARCHITECTURE OF. It is somewhat singular that while the Italian artists, unacquainted with Grecian examples, took the writings of Vitruvius as their canons for the different orders, there existed at no great distance from the city of Naples examples of primitive Doric architecture of far more severe character and more massive proportions than any in Greece itself, if we except the temple at Corinth. Mazocchi, in his work above referred to, observes that the monuments at Pæstum could not be referred to any of the architectural orders of Vitruvius; but he does not appear to be aware what they really are.

These structures, now almost the sole evidence of the opulence of Posidonia or Pæstum, are three in number, and two of them in tolerably perfect preservation. The solidity of their construction almost bids defiance to all attempts to destroy them for the sake of their materials; while other ruins within the walls of the city plainly attest how completely the work of destruction has been carried on around them. Even of the amphitheatre nothing now remains but traces of its general form and winding vaults. According to Paoli, the architecture of the Pæstum temples is to be considered rather as Etruscan than Grecian; yet whatever may be the country of the architects, there is no disputing that the buildings themselves essentially belong to the Doric style, their distinct character in that respect rendering their peculiarities all the more striking. We find here precisely the same features and members, only with a difference; and moreover precisely the same disposition. In fact it is only for the differences of the kind alluded to that these temples are at all remarkable; since in their plans and all other particulars they present nothing more than what is common to nearly all Greek temples, namely, a cella surrounded by external colonnades, or peripteral.

Both those at Pæstum are peripteral and hexastyle, the only difference between them being that the larger one has fourteen columns on each of its sides (reckoning again those at the angles), and the other only thirteen. The first (which is 195 feet long by 79 wide) is *hypæthral*, or open to the sky; that is, its cella forms an inner court, with a range of seven Doric columns on each side supporting an architrave, on which stands a second range of smaller columns of the same order; which arrangement produces a most uncouth effect. The floor of this cella is raised several feet higher than that of the external colonnades. The external columns are of extraordinary massiveness, being seven feet in diameter at their base, though only 29·10′ high; and as their upper diameter below the capital is not more than 4·9′, their shafts decrease very suddenly; one, though not the most unfortunate consequence of which is, that, as compared with the necking of the column, the capital and abacus spread out exceedingly. Another singularity is that the architrave does not at all overhang the upper part of the columns, its soffit being of the same thickness as the top of their shafts beneath their capitals; whereas in nearly all examples of the Grecian Doric the face of the architrave is in a plane that would intersect the shaft of the column nearly at its base.* In comparison with the height of the columns, the entablature is exceeding deep and ponderous, being equal to one half of that of their shafts exclusive of the capital; which unusual massiveness of the upper part is in perfect accordance with that of the columns.

The smaller temple, sometimes called that of Ceres, as the other is that of Neptune, measures 107 by 47 feet, and, as has been observed, is hexastyle peripteral; though if so far perfectly similar to the one just described, it has one very remarkable singularity in its plan, which is that the pronaos is not formed by columns between antæ, and consequently enclosed at its sides, but has two columns and a half column on each side, which latter is attached, instead of an anta, to the end of the wall of the cella. These columns are raised upon a socle one behind the other, and have small bases. As regards the external order, one very remarkable peculiarity in the detail of the columns is, that for the usual narrow channels and annulets forming the hypotrachelium, or necking beneath the capital, a very deep cavetto, or hollow, is substituted, which is carved. The ornament thus produced has been generally compared to leaves, and some have most fancifully suggested that we here find the first rudiments of foliage for the decoration of capitals; whereas, to say nothing of the utter dissimilarity between such ornament and foliage properly so termed, it consists of what look more like husks than any kind of leaves.

Besides these there is a third building, which has greatly puzzled antiquaries on account of its having an odd number of columns, viz. nine in each front, which circumstance has led them to suppose that it could not have been erected for a temple, but must have been a basilica, palæstra, or other public building. Except however as regards what, owing to there being no remains of pediment to call attention to the central column, does not at all strike the eye, there is nothing whatever in the character of the design to distinguish it from the generality of Greek temples, it being merely a peripteral building (whose dimensions are 177 feet by 75) with nine columns at each end and eighteen on each of its longer sides, those at the angles of the former being reckoned again. The only thing at all remarkable now to be traced in its plan is that it was divided in its breadth by an internal range of columns in the middle, three of which are yet remaining; on which account Hirt conjectures it to have been a double temple, with a single cella divided by a mere screen of columns, and dedicated to the Dioscuri, as the tutelary deities of navigation and the protectors of the port of Pæstum; or rather, according to his restoration of the plan, the part of the cella so divided off was merely a very deep pronaos, having three columns *in antis* in front, and a range of four columns within, forming a double avenue leading to two smaller sanctuaries containing the altars or statues of the respective divinities. Yet as no internal walls now exist, it has generally been supposed that there never was any kind of cella or enclosure within the external colonnades.

The order itself is very remarkable, for besides the neckings of the columns being ornamented somewhat similarly to those of the smaller temple, the shafts are very much curved, so as to seem almost to belly out in their middle, owing to their diminishing very suddenly at about two-thirds of their height, while the contraction just at the necking causes the abacus to appear of extraordinary magnitude, its breadth being in fact considerably more than double the upper diameter of the shaft, whereas in Athenian examples of the order the average proportion of the abacus is only one half more than the upper diameter.

In order to show at one view both the actual dimensions and proportions of the columns, we give them in feet and inches, without regard to fractional parts of the latter; and that they may be readily compared with the Corinth example, which most nearly approaches to them in massiveness, that also is added. At the same time we are enabled to correct a mistake in the table of Doric examples at page 387 of Column, where the lower diameter is stated to be only 2 feet 5·10 inches, and the upper one 4 feet 4·10′.

		Height of column including capital.	Lower Diam.	Upper Diam.
Great Temple at Pæstum	.	29·10′	7·0′	4·9′
Smaller temple ditto	.	20·4′	4·3′	3 0′
Third temple, or basilica	.	20·10′	4·9′	3 1′
Temple at Corinth	.	23·8′	5 10′	4·4′

PAEZ, PEDRO, a celebrated Jesuit missionary, was born at Olmedo, a town in New Castile, in 1564. Having completed his studies at the college of his order, he was appointed to form part of the mission at Goa, and sailed for that port in 1587. At that time the numerous Portuguese who had resided in Abyssinia since the invasion of Christoval de Gama, being without a patriarch or spiritual director of any sort [Abyssinia], sent to Goa for some priests, when Paez and another Jesuit, named Antonio Montserrat, were despatched by the governor. The two missionaries sailed from Goa in 1588; they touched at Diu, where they made some stay, disguised as Armenians. They then sailed for Muscat, on the 5th of April, 1588. From thence they made for the port of Zeila in Abyssinia; but on their passage thither they were boarded by an Arab pirate, in sight of Dofar (14th Feb., 1589), and carried in irons to the capital of the king of Shael (Xaer in the Portuguese writers). They were at first kindly treated by this sovereign; but he himself being a tributary to the Turkish pasha of Yemen, and bound by treaty to send him all the Portuguese who might fall into his hands, Paez and his companion were sent to Sanáa, the capital of Yemen and the court of the pasha, where they passed seven years in the most dreadful captivity. Being at last released by the intercession of the viceroy of India, who obtained their liberty upon the payment of a thousand crowns ransom for each, the two missionaries returned to Goa in 1596. The ardour of Paez seems not to have been damped by his past sufferings; on the contrary, after spending several years at Diu and Cambova, he embarked a second time for Abyssinia, and landed at Masawa in April, 1603. His first object was to learn one of the most extensively used native dialects, the Gheez, in which he soon acquired such a proficiency as to be enabled to translate into it the compendium of the Christian doctrine written by Marcos George, and to instruct some native children in the dialogues which that work contains. In 1604, Za-Denghel, the reigning monarch of Abyssinia, hearing of the attainments of Paez and the proficiency of his pupils, ordered him to appear at his court with two of them, that he might judge for himself. Paez was kindly received by the king, who conferred upon him all sorts of honours and distinctions. On the following day a thesis was maintained in his royal presence, when Paez's pupils answered every argument adduced by their opponents: the mass was next celebrated, in conformity with the Roman ritual; after which Paez preached a sermon in Gheez with so much success, that the king himself became a convert to the new religion, and wrote to the pope, and to Philip III., then on the throne of Spain, praying them to send him a reinforcement of missionaries. This wish of the monarch, having been made public, proved fatal to him; for the Abyssinian priests, dreading the ascendency which Paez and his followers had attained at court, excited a rebellion, and Za-Denghel was killed in a battle with his revolted subjects, on the confines of the province of Gojam (Oct., 1604). Socinos, otherwise called Melek-Segbed, who sucseeded Za Dengel in the empire, was still more favourable to the views of the Portuguese missionary. Soon after his accession to the throne, he summoned to his presence Paez, who celebrated mass and preached before all his court, assembled for the purpose. He granted him, besides, a large piece of ground at Gorgora, on a rocky peninsula on the south side of the lake Dembea, to build a monastery for his order and a palace for himself. On this occasion, without the assistance of any European, but with the mere help of the natives working under his orders, Paez produced a building which was the astonishment of those who beheld it. A spring-lock, which he fixed upon one of the doors, saved the king's life when an attempt was afterwards made to assassinate him. Paez lived in great intimacy with Socinios, whom he accompanied in all his military expeditions. It was on one of these occasions that he visited Naguina, a town three days' march from the sources of the Nile, and surveyed the neighbouring country, a fact which Bruce endeavoured to discredit, for the purpose of appropriating to himself the glory of being the first European who visited the source of the Abawi, then reputed to be the main branch of the Nile. [BRUCE.] Pedro Paez died in the beginning of May, 1622, at the age of forty-eight, after having the satisfaction of seeing his missionary labours crowned with success, and persuading the king to receive the general confession, and repudiate all his wives but one. Catholicism, thus introduced into Abyssinia, did not long remain the religion of the state. After the death of Socinios (1632), his successor, Facilidas, persecuted the Jesuits and re-established the old creed, which was Christianity, though in a corrupt form. Besides the translation of the Catechism written by Marcos George and other tracts into the native dialect of Abyssinia, Nicolas Antonio (*Bib. Nov.*, vol. ii., p. 225) attributes to Paez a treatise 'De Abyssinorum Erroribus,' a general history of Ethiopia which was supposed to exist in manuscript at Rome, and several letters which have been published in the collection entitled 'Litteræ Annuæ.'

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* See Column, p. 385, cut of the Greek Doric order of the Parthenon, which besides explaining what is said of the architrave's overhanging the column, will by comparison shew how very much more massive are the Pæstan edifices.

(*Historia de Ethiopia a alta*, by Manoel de Almeida, MS., in the British Museum, No. 9861, fol. 195; Ludolf's *Historia Æthiopica*; Bruce's *Travels*; Salt's *Abyssinia*.)

PAGAN, BLAISE FRANÇOIS, COMTE DE, distinguished both as a military engineer and a mathematician, was descended from a noble Neapolitan family, and born at Avignon in France, in 1604. Under the auspices of his relative, the constable De Luynes, he entered the French army very young, and, no less by his gallantry and talents than by his family connexions, rose rapidly to rank and reputation. At the siege of Montauban he lost his left eye by a musket shot; but this did not check his zealous career of service, and he continued to increase his celebrity as an officer throughout the wars of the reign of Louis XIII., until, being sent into Portugal in 1642, with the rank of maréchal de camp, he had the misfortune to contract a distemper in that country, which entailed the loss of his other eye, and rendered him totally blind, at the early age of thirty-eight years. Being thus incapacitated from further serving his country in the field, he applied himself, with characteristic energy, to study the theory of a profession which he had already successfully practised; and, in 1645, he published his 'Traité des Fortifications,' the ablest essay on the science of defence which the world had yet seen. With no less ardour he had engaged in the kindred pursuit of mathematical research; and the fruits of his labours were exhibited in the publication, in 1651, of his 'Théorèmes Géométriques,' followed, in 1657 and 1658, by a treatise on the planetary theory, and some astronomical tables, all of which were highly esteemed by his contemporaries. He was also the translator of a Spanish account of the river Amazon, accompanied by a chart, the draught of which he is said, though blind, to have drawn with his own hand. With all his mental accomplishments, however, Pagan was not without that common weakness of his age,—a belief in judicial astronomy. But this foible was redeemed by many estimable qualities of head and heart, for which he lived highly respected both in the courtly and the learned circles of his country and times. He died at Paris, universally honoured, in 1665.

The mathematical works of Pagan have lost their value; but, as an engineer, he must ever be numbered among the great masters of the art of fortification. He belonged in fact to that rare order of minds whose creations form an epoch in the history of any science. He corrected the errors and combined the advantages which he found in the systems of the Italian and Flemish engineers; and though he had been preceded in France by Errard and De Ville, and was followed and excelled by Vauban, he may justly be considered as the founder of the French school of fortifying. He signally improved the old defective construction of bastions; he first gave due proportions to their faces, flanks, and lines of defence; and he either originated or adopted the idea of a perpendicular flanking fire, which, though neglected by Vauban, has become the great principle of all the modern systems.

PAGE'LLUS, a genus of fishes of the order Acanthopterygii, and family Sparidæ. This genus, established by Cuvier, contains all those sparoid fishes in which the front teeth are small and prickly, and very numerous; the molars are of a round form, and there are sometimes more than two rows of them; but the two outer rows in these cases are always much the largest. The foremost teeth form a dense mass, and are compared by Cuvier to the bristly points of the carding-machine used in combing wool, a character which distinguishes these fishes from those of the genus *Pagrus*, in which the foremost teeth are conical; the molar teeth moreover are smaller than in the last-mentioned genus. The body is usually of an elongate-ovate and compressed form, and the dorsal fins are continuous. About six European and five extra-European species of Pagellus are known. Two species occur on our own coast: the Spanish Bream (*Pagellus erythrinus*, Cuv. et Val.), which is of a fine carmine-red colour above, passing into rose-colour on the sides of the body, and tinted with silvery white beneath; and the Sea-Bream (*Pagellus centrodontus*, Cuv. et Val.), which is also known by the names of the Gilt-head and Red Gilt-head. The former of these two species is very common in the Mediterranean, but occurs rarely off the British coast. Mr. Yarrell states that he has never seen above two or three specimens, and these were taken with the Sea-Bream, which is also common in the Mediterranean, and by no means uncommon on our own coast.

The following is the description of the Sea-Bream given by the author of the 'History of British Fishes.' The jaws are short, and equal in length; the eye is very large, irides golden yellow; the head short; the line of the profile descends rapidly; cheeks, operculum, and interoperculum covered with scales; the preoperculum and part of the space before and under the orbit have a metallic tin-foil appearance; two narrow stripes are observable on each side behind the head, and these meet on the central line at the top; at the origin of the lateral line, behind the edge of the operculum, is a conspicuous dark patch made up of small spots; the colour of the body is reddish, tinged with grey; lighter on the sides, which are golden grey, and marked with faint longitudinal bands, which extend the whole length of the body: the belly is nearly white, and the dorsal and anal fins are brown, each appearing as if lodged in a groove from the rising edges of the skin and scales along the base; the pectoral fins and tail are red, and the ventrals are grey.

The Sea-Bream is not highly esteemed for the table. It is found most abundantly in the summer and autumn, and apparently leaves the coast in the cold weather. Mr. Yarrell moreover states that the spawn is shed in the beginning of winter in deep water; and in January the young fish, which are called Chads, of about one inch in length, are found in the stomachs of large fishes taken two or three leagues from land: in summer, when from four to six inches long, they abound in innumerable multitudes, and are taken by anglers in harbours, and from the rocks; for they bite with great eagerness at any bait, even of the flesh of their own species. The food, both of the young and adult fish, is not however confined to animal substance, for they devour the green species of sea-weeds, which they bite from the rocks, and for bruising which their molar teeth are well suited, as are their long and capacious intestines for digesting them.

The Spanish Bream is rather more slender in its form than the commoner British species, the eyes are smaller, and the mouth has a wider gape. The colouring is also different; it has not the dark patch which is observable on each side of the body near the head in the Sea-Bream.

PAGO'DA, a corruption of the Sanscrit *bhagavati*, 'holy-house,' is a name generally applied by Europeans to temples in the East, from China to Hindustan. These structures generally consist of a porch, a vestibule or ante-sanctuary for the priests, and an inner sanctuary, containing the principal idol. Some of the Chinese pagodas, or rather the courts enclosing them, are of very great extent, as for instance that of Ho-nang in the south suburb of Conan, the interior area of which is an oblong of 590 by 250 feet, surrounded by cells for the Bonzes, in the centre of which quadrangle are three pagodas or pavilions, each 33 feet square, elevated upon a terrace, and consisting of two stories, the lowermost surrounded by a peristyle of twenty-four columns. Some of the Chinese temples are lofty towers in several stories, diminishing in height and width as they ascend, each having a projecting roof of glazed tiles, and generally ornamented with bells. Among the buildings erected in Kew Gardens by Sir W. Chambers is a lofty Chinese pagoda of this kind; yet although called pagodas by Europeans, the name given by the Chinese themselves to such towers is *Taas*. There is a very celebrated Taa at Nankin, composed of porcelain: it is, like most others, an octagon, upwards of 210 feet high, and divided into ten stories, each of which has a marble gallery with gilt lattices, the stairs being formed within the thickness of the walls. The summit is surmounted by a cupola, from which rises a lofty pole or mast about thirty feet high. Of that at Tong-Tschang-Fou, the exterior is also of porcelain, but the walls themselves are of marble. Others have a single staircase in the centre carried up through all the different stories. Although so completely dissimilar in style, these Taas bear a strong analogy to the Gopuras and Vimanas, or lofty pyramid tower-temples, of the Hindus. [HINDU ARCHITECTURE.] Both seem to have originated in a common idea, differently modified, according to the taste and mode of building of the respective nations.

PAGU'RIANS, a tribe of the apterurous section of the Anomurous family of crustaceans, composed of a considernumber of species, the greater part of which are remarkable for the more or less complete softness of the abdomen, the want of symmetry in the appendages of this part of the body, the shortness of the two posterior pairs of feet, and many other characters. In the greater number, the abdomen is small, nearly entirely membranous, and partially rolled upon itself; and for the protection of this defenceless part the animal lodges it in the turbinated shell, generally, of some gastropod. The crab is retained in the shell by the aid of the posterior feet, and a pair of crustaceous appendages at the end of the abdomen. In some species it is further fixed by means of certain organs on the lower side of the abdomen, to which we shall hereafter allude. The popular names by which these crustaceans are known in Britain and the West India Islands are *Hermit-Crabs* and *Soldier-Crabs*; and in France they are called *Bernards l'Hermite*. They are held so firmly in the shell of which they have possessed themselves, that they move about with it more or less briskly according to its comparative size or aptitude.

ORGANIZATION.

The *carapace* is divided into many portions by lines, which are more or less membranous; one of these depressions or furrows separates it transversely into two halves, the anterior of which constitutes the stomachal region, and is very nearly confluent with the hepatic regions, which are very small, and occupy its posterior angles. The last or posterior half is divided longitudinally into three portions; the median portion constitutes the cardial and intestinal regions, and the two lateral portions form the branchial regions, which last are separated by a similar line from the lateral parts of the carapace, which descend towards the base of the feet. The ophthalmic ring is sometimes hidden above by a rostriform prolongation of the carapace, but is always free, and has above two small prolongations in the form of scales; the *ocular peduncles*, which are directed forwards, are not retractile, and are inserted directly above the *internal antennæ*, which present very variable dimensions, but always have the basilary joint either small or elongated, and are fixed by two short or moderate multiarticulate filaments. The *external antennæ* are inserted on the outside of the internal ones, on the sides of the ocular peduncles; their second joint has, above, a spiniform piece, which is ordinarily moveable, and seems to be analogous to the palp. The external *jaw-feet* are pediform. The *sternum* is nearly linear forwards, and is a little enlarged posteriorly; the two last rings of the thorax are entirely free and moveable, and the last reaches beyond the carapace, and is completed above by a tergal horny piece. e *anterior feet* are large, and nearly always of unequal nensions; they are terminated by a large *manus*, the claws which are short and very stout. The two succeeding pairs are very large; the fourth pair, on the contrary, are short, elevated above the others, and nearly always terminated by a didactylous hand; the fifth pair are equally short, elevated on the sides of the body, and terminated by a more or less well-formed pincer. The first five rings of the abdomen are represented by horny plates of greater or less size, the first of which ordinarily is nearly confluent with the last thoracic ring; sometimes this first abdominal segment is in both sexes furnished with a pair of rudimentary appendages applied against the base of the posterior feet; but in general it is without them. In the male the second segment also is sometimes furnished with a pair of false feet, but in general only gives insertion to an appendage placed on the left side; the three succeeding segments are always deprived of appendages on the right side, and sometimes present none on the left in the male; ordinarily they each support a false foot composed of a basilary cylindrical stem and one or two terminal blades; these appendages, which are consequently four in number, generally, are always very small in the male and rather large in the female, whose eggs they serve to fix. At the extremity of the abdomen are two horny plates, which represent the sixth and seventh segments, and a pair of appendages, nearly always non-symmetrical, and terminated by two stout and short branches, which are fixed to the plate holding the place of the sixth abdominal ring. (Milne Edwards.)

Mr. Broderip, in a paper 'On the Habits and Structure of *Paguri*,' *Zool. Journ.*, vol. iv.), states, that in pursuing his inquiries upon that subject he had been struck with two beautiful provisions in their animal economy. Their backs are towards the arch of the turbinated shell occupied by them, and their well-armed nippers and first two pair of succeeding feet generally project beyond the mouth of it. The short feet rest upon the polished surface of the columella, and the outer surface of their termination, especially that of the first pair, is in some species most admirably rough-shod, to give 'the Soldier' a firm footing when he makes his sortie, or to add to the resistance of the crustaceous holders at the end of his abdomen or tail, when he is attacked and wishes to withdraw into his castle. On passing the finger downwards over the termination of these feet, they feel smooth; but if the finger be passed upwards, the roughness is instantly perceived. The same sort of structure (it is as rough as a file) is to be seen in the smaller caudal holders. The second provision he observed in a very fine and large species of *Pagurus* from the Mauritius (*Pagurus guttatus* of Olivier, he is inclined to believe). Two specimens (now in the British Museum) were in his possession, one of which is housed in a very large young shell of *Pterocerus truncatum*, the other (nearly a foot long) is naked, and on examining the under side of the abdomen or tail of this specimen, a great number of transverse rows of acetabula were to be seen, even without the aid of a glass. Dr. Bright has another naked specimen, in which the same formation, which must very much assist the hold of the *Pagurus*, is visible.

Respiratory System.—MM. Audouin and Milne Edwards, in their interesting memoir, 'De la Respiration aérienne des Crustacés, et des modifications que l'appareil branchial éprouve dans les Crabes terrestres,' show, that in all the crustacea the branchiæ are fitted to perform the functions of respiratory organs in the air as well as in the water, and that one of the conditions necessary to the support of life in animals which have branchiæ and live in the air, is the having these organs defended against desiccation. The provision for this necessary condition in the Land-Crabs will be found in the article GECARCINUS; and the habits of some of the Pagurians demand such a provision, as we shall presently see.

In the museum of the Royal College of Surgeons (Physiological Series, No. 993, D.) is a preparation of a Hermit-Crab (*Pagurus Streblonyx*, Leach), with the branchiæ injected and exposed on both sides. No. 993 of the same series is a small crab (*Cancer Pagurus*, Leach), with the carapace and all the viscera removed except the branchiæ. These are crossed, and, as it were, bound together, by a narrow flattened process, which extends from the anterior part of the branchial cavity. (*Cat.*)

Digestive System.—No. 612 of the Physiological Series in the museum of the College of Surgeons exhibits a Hermit-Crab (*Pagurus punctulatus*, Oliv.), laid open on the ventral aspect to expose its intestinal canal. Its structure and disposition are as simple as that of the Scorpion (*Buthus Africanus*), which immediately precedes it. The canal grows gradually narrower to its termination, which is just below the last crustaceous appendage of the tail. (*Cat.*)

Brain and Nervous System.—In the museum of the Royal College of Surgeons, in London (*Physiological Series*) will be found (No. 1363, B) a Hermit-crab (*Pagurus pedunculatus*, Herbst.) dissected by Professor Owen for the display of the nervous system. The cephalic ganglion is of large size, and transversely quadrate in form; the origins of the large nerves which it gives off to the eyes and antennæ are shown. The lateral chords unite below the alimentary canal to form a ganglion, which supplies the maxillary apparatus; the chords then form a large oblong ganglion situated at the base of the chelæ, and extending to the origins of the second pair of ambulatory feet, both of which pairs it supplies. The lateral chords, greatly enlarged, separate from each other for a short distance, and re-unite to form a third central ganglion, smaller than the second, which supplies the third pair of ambulatory feet, and gives off posteriorly three pairs of nerves. Of these the lateral pair supply the fourth diminutive pair of feet; the mesial pair the fifth; and the dorsal pair, of extremely minute size, are the continuations of the main chords, and pass along the concave side of the soft membranous post-abdomen to the anus, anterior to which a small ganglion is formed, which gives off the nerves to the caudal lamellæ, here converted into clasps, enabling the animal to adhere to the columella of the univalve shell which it may have selected to protect that part of the body which nature has left undefended by a crustaceous covering. (*Cat.*, vol. iii., part 1.)

Senses.—The above paragraph will show the extent to which sight, touch, and taste are developed; and in the same series of the same museum (No. 1559, A) is a Hermit-Crab (*Pagurus Miles*, Oliv.) prepared by the same skilful hands to show the organ of hearing, which is composed of a simple spheroidal cavity situated at the under part of the basal joint of the external antennæ. The cavity is surrounded by a dense crustaceous substance, except at the internal opening, where the auditory filament of the antennal nerve penetrates it, and at the opposite side, where an elliptical opening is left, which is closed by the acoustic membrane; the vibrations of sound affect this membrane, and are transmitted to the nerve, which is exposed on the left side. (*Cat.*, vol. iii., part 1.)

History.—The *Pagurus* of Aristotle is not a Hermit-crab; but he describes three kinds of Hermit-crabs under the name *καρκίνιον* (*Carcinium*). They are termed *καρκινὰς* by Oppian, Ælian, and Galen. Pliny seems to confound them with the *Pinnotheres* or *Pinnophylax*, as is noticed by Aldrovandus. Rondeletius, Belon, and Gesner describe them; the latter very particularly. Jonston's account is little beyond a compilation from the authors above named. Charlevoix ('History of Hispaniola'), says, 'that kind which is called a soldier (soldat) is, as well as the crab, a species of crawfish (écrevisse) or of that sort which is called *Cancellus Marinus*. It is found all along the sea, and is good to eat. It has its name from being armed all over the body, except at the lower extremity, where it is naked, and where it seems to possess great sensibility; it therefore domiciles itself, as soon as it is born, in the first shell it meets with; but to dislodge it, it is only necessary to place it near the fire.'

None of the writers here quoted appear to speak of these animals as being at any time terrestrial, and the others who have given any account of them will be mentioned in the next paragraph, which treats of their habits, &c.

Habits, Food, Reproduction, &c.—Labat mentions 'the soldiers' among the animals that descend every year to the sea to bathe themselves and change their skin or their shell. The old French Encyclopædia defines *Bernard l'Hermite* to be *cancellus*, an animal of the crustaceous genus also called *Soldier*. After a very particular description, the account proceeds thus:—'There are in the isles of America Hermit-crabs (*Bernards l'Hermite*) which are three or four inches in length. They relate that this animal comes once a year to the edge of the sea, to lay its eggs and change the shell; for it is obliged to quit the shell in which it is lodged, because, having increased in size during the year, it finds itself incommoded in that shell. It therefore comes to the shore and seeks a new shell which may be convenient for it. As soon as it meets with one, it comes out of the old one and tries the new lodging, and, if that suits, it remains there; but it is often obliged to enter many shells before it finds one proportioned to it. If it happens that two hermit-crabs stop before the same shell, a dispute arises, and the weakest yields to the strongest.' The same author states, that it pinches hard and does not let go its hold easily, and that the inhabitants eat it, finding it very good, though it does not agree with strangers. This account appears to have been taken from Du Tertre's 'Voyage.'

Sloane thus describes 'the Soldier:'—'This small lobster or crab differs in very little from the European souldier or hermit-crab. It hath two large forked claws like those of an ordinary lobster, one of which is bigger than the other, both rounded, more tumid, less prickly, and of a paler red than that of Europe, &c. They fit themselves with any shell they find empty, whether it be of the land or sea, and cover themselves almost over in it, carrying it on their backs wherever they go, like a snail. It is not possible to believe how quick the land-crabs and this crab will run upon the least appearance of danger. Till they are turned up, nothing appears but a dead shell, the mouth of which lies undermost, out of which some little part of the crab appears after it is taken up.' (*Jamaica.*) Sloane figures two of these animals (apparently *Cenobita Diogenes*) in land-shells (*Helices*), and we saw an individual of the last-named species alive in the shell of a *Helix* at the Garden of the Zoological Society in the Regent's Park.

Catesby, who figures a *Cenobita Diogenes* in the shell of *Turbo Pica*, says, 'They crawl very fast with their shell on their back; and at the approach of danger draw themselves within the shell; and thrusting out the larger claw in a defensive posture, will pinch very hard whatever molests them. They frequent most those parts of the sea-shores which are covered with trees and shrubs producing various wild fruits on which they subsist; though I have seen them feed on the fragments of fish and other animal substances cast on shore. They being roasted in the shell are esteemed delicate. I do not remember to have seen any of them go into the sea.' (*Carolina.*)

Browne notices 'the Soldier' and 'the Common Soldier,' and states that the latter is very common in all the harbours of Jamaica. (*Jamaica.*)

Linnæus says of the *Diogenes* that it inhabits the Asiatic and American Ocean in various shells of *Cochleæ*.

Cuvier, after mentioning univalve shells as the usual covering of the genus *Pagurus* (Fabr.), remarks that some species lodge themselves in *Serpulæ*, *Alcyonia*, &c.; and we have seen individuals lodged in *Alcyonia*. Cuvier also observes that it would even seem that some of the *Paguri* are terrestrial.

Not to detain the reader with those authors whose labours have been principally confined to classification, such as Herbst, Fabricius, Olivier, Latreille, Leach, Duméril, Brisson, Bosc, Risso, and others, we call his attention to the observations of M. Desmarest, who says that these crabs are ordinarily met with on the shallows of flat sea-shores (plages) at a small depth, and may be seen creeping along the bottom by the help of their claws and other fore-feet. Their progress is slow and irregular. They live, like other crustaceans, on small animals of the same class, or on mollusks which pass within reach of their claws and they are able to seize. Naturalists, he adds, make mention of many species of *Paguri* that live on land at a considerable distance from the shore and lodge themselves in holes, and he thinks it probable that such ought to enter into the genus *Birgus*. (*Considérations générales sur la classe des Crustacés.*)

But whatever may have been the form of the terrestrial *Paguri* above alluded to as lodging in holes, the specimens sent to Mr. Broderip by Mr. De la Beche, and forming part of the interesting letter to which we shall presently advert were true hermit-crabs of two species, one *Pagurus* (Cenobita) *Diogenes*, and the other somewhat resembling *Pagurus Prideaux* (Leach). Of the first, there were forty-two of various sizes, and they were housed in the following marine shells, which were, in every instance, well adapted to the bulk of the inhabitant. Two were lodged in *Turbo Pica*, two in *Natica Canrena*, and one in *Bulla Striata*. There were eight in *Fasciolaria Tulipa*, and twenty-nine in *Pyrula Melongena*. Of the latter species of *Pagurus* (the 'Common Soldier' of Browne) there were ten. One was housed in *Fasciolaria Tulipa*, and nine in *Pyrula Melongena*. The shells chosen by these last were large in proportion to the bulk of the inhabitant, so large indeed, that some of the *Paguri* were scarcely visible. The following is an extract from Mr. De la Beche's letter to Mr. Broderip, dated 1st August, 1828:—

'When I was in Jamaica, about three years since, some of the persons on my estate at Halse Hall brought me specimens of *Paguri*, which they said they had obtained from a savannah, distant about a quarter of a mile from the house. This savannah is a plain formed of what I have elsewhere* termed savannah sandstone and conglomerate. It is very dry and covered for the most part with log-wood, green ebony, lignum vitæ, the cashew-tree, and, here and there, with patches of grass and other plants. After heavy rains the surface of the ground is nearly covered with herbage; but, after dry weather, a considerable portion of the soil is exposed. The savannah, which is of great extent (my portion consists of at least two thousand acres), is about thirty feet above the Rio Minho, which runs round the border of it, and about two hundred feet above the level of the sea, from which it is distant at least ten miles. The tide only penetrates just within the mouth of the river, and rises there about eleven inches at the height of the springs, so that there is not even brackish water at a nearer point than ten miles. When the *Paguri* were brought to me, they were alive, and I observed they were housed in marine shells, and at first thought they must have been brought from the sea. Upon inquiry however I found that these animals, under the name of 'soldiers,' were frequently taken alive for food in the savannah, to which I immediately proceeded. On its northern side and at its junction with the hill that rises above it, I found in the little hollows of the white limestone several of these *Paguri*, all in marine shells, and in full health and activity. I afterwards learnt that they were by no means uncommon in such situations all over the island. When I saw them, there had been a good deal of wet weather. They were in moist places, but there were no pools of water.'

Another gentleman, who resided some time in the West Indies, informed Mr. Broderip that he had seen the first mentioned species (*Diogenes*) about his house, when he lived at Port Henderson, and that he had also observed them about the houses at Spanish Town, a place about six miles distant from the sea. Mr. Broderip was also informed that Westmoreland swarmed with them. (*Zool. Journ.*)

Place in the System, and Classification.—M. Milne Edwards, who places the *Pagurians* immediately after the *Hippians* and at the end of the brachyurous crustaceans, divides the tribe into the genera *Pagurus*, *Cancellus*, *Cenobites*, and *Birgus*.

Pagurus. (Fabricius.)

A great resemblance exists among all the *Paguri*, properly so called, not only in the details of their organization, but in their habits. The cephalo-thoracic portion of their body is shorter than the abdominal portion. The *carapace* is nearly as large before as it is behind, and is but little or not at all prolonged laterally above the base of the feet; posteriorly it is strongly notched in the middle, and anteriorly it is either truncated or armed with a single rudimentary rostrum. The basilary portion of the ocular peduncles is exposed. The *internal antennæ* are placed directly above these peduncles; their first joint is convex and nearly globular; the two next are delicate and cylindrical, and only go a little beyond either the peduncular portion of the external antennæ, or the eyes: the terminal stemlets of these organs are very short, and have the same form as those of the brachyurous crustaceans. The *external antennæ* are inserted on the same line as the ocular peduncles, and have, above, a stout moveable spine which represents the palp; the last joint of their peduncle is slender and cylindrical, and they are fixed by a multi-articulate filament which is very long. The *external jaw-feet* are moderate in size, their stem is pediform, and their palp very much developed. The *anterior feet* are in general very unequal, and one of the hands very convex. The fourth pair of feet are very short, and their penultimate joint, furnished above with a somewhat oval warty plate, is in general very large, and prolonged above the next joint, so as to constitute with it a didactylous pincer. The fifth pair are longer, more slender, more recurved upwards, present also towards the end a granulous plate, and are terminated by a more or less well-formed didactylous pincer. The *abdomen* is of considerable size and membranous, the plates of its dorsal rface are nearly symmetrical, but very delicate, and dis- it from each other. Sometimes there is at the base of the abdomen of the female a pair of rudimentary false feet, and two pairs of appendages more developed in the male; but in general the first segment is without any, and the second, as well as the three succeeding segments, has a single one placed on the left side, and fixed to the border of the dorsal plate. These appendages are always small, and terminated by one, two, or even three ciliated lamellæ upon their edges, which, in the female, are of considerable dimensions, and serve for the insertion of the eggs. The appendages of the penultimate ring of the abdomen are each composed of a basilary joint, which is short and stout, supporting two other short and hooked pieces, one of which is inserted at its inferior border, the other at its extremity, and each furnished with a warty plate similar to that on the posterior feet. These two false caudal feet have not exactly the same form, and are of very unequal size, that of the right side being much smaller than the other. (M. E.)

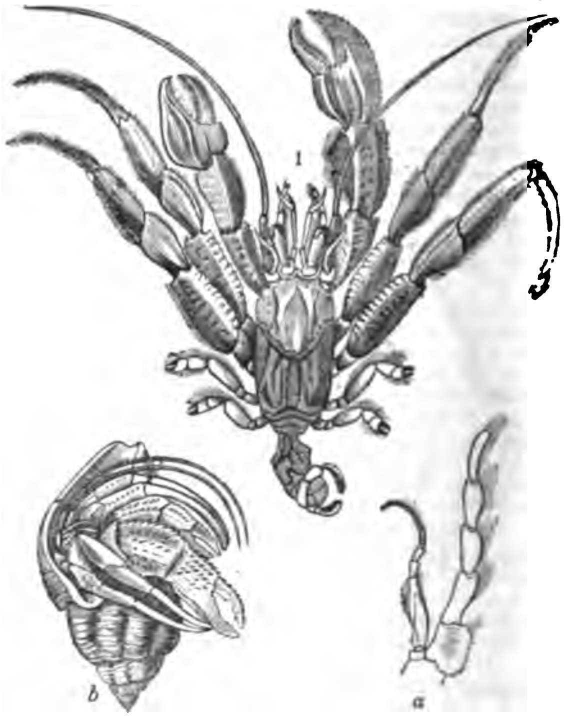
The species are numerous, and are divided by M. Milne Edwards into the following sections.

§ Species whose ophthalmic ring is not armed above with a median rostriform piece.

A. Ocular peduncles large, and shorter than the basilary portion of the external antennæ.

a. Spiniform palp of the external antennæ going beyond the extremity of the ocular peduncles.

In this section there are three species. We select the *Common Hermit-Crab, Pagurus Bernardus*, as an example.



Pagurus Bernardus.

1, out of the shell; a, right jaw-foot; b, in the shell.

Description.—Anterior border of the carapace rather deeply notched above the base of the ocular peduncles, and presenting on the median line a projecting angle which has the semblance of a small obtuse rostrum. Ocular peduncles stout, short, of the same length as the portion of the front which covers their base, and swollen, as it were, at the end. A wide space between the two basilary joints of these peduncles, which are armed with a large tooth, flattened and nearly oval, or rather lanceolate. Third joint of the internal antennæ scarcely reaching beyond the basilary portion of the external antennæ, the second joint of which is armed at its external angle with a very sharp tooth, and supports on the middle of its upper border the spiniform palp, which is very long (at least as long as the terminal joint of the ocular peduncles), slender from its base, and recurved below, then forwards, a little in the form of the letter S. Anterior feet stout, and rough with isolated, unequal, and more or less spiniform tubercles: the right much stouter than the left; carpus nearly as long as the palmary portion of the hand, which is convex above; the pincers stout, very obtuse, and without a distinct terminal nail. Second and third pair spiny and tubercular above; their the joint very small, compressed, twisted on itself and enlarged a little towards its extremity, which afterwards is rapidly narrowed to a point. Third pair separated at their base by a small sternal plastron, which is nearly square. Hands of the posterior feet very short, and terminated by a very flat and extremely short pincer. Abdomen with lateral plates only in its membranous part. In the female, four false oviferous feet, formed by a cylindrical and elongated joint, and two lamellar terminal branches. Fourth false foot much smaller than the others, and its external branch rudimentary. In the male, three false feet, composed equally of a cylindrical joint, and of two terminal pieces, one of which is lamellar and rather large; the other rudimentary; no similar appendages on the right; a semilunar notch at the posterior border of the terminal lamina of the abdomen. Ordinary length about 5 inches, sometimes more.

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* 'Geo. Trans., vol. ii., new series.

Locality.—Coasts of England, France, and of Northern Europe as far as Iceland.

c c. Spiniform palp of the external antennæ exceeded by the ocular peduncles.

Example, *Pagurus striatus.* The anterior feet of this species are very large, especially that of the right side. They are covered nearly throughout with transverse lines, which are curved, tubercular, and furnished with small rather thick-set hairs on the upper part of the member; many of the tubercles of these squamiform lines acquire sufficiently large dimensions to become large pointed spines. Colour red mixed with yellow. Length from 7 to rather more than 8 inches.

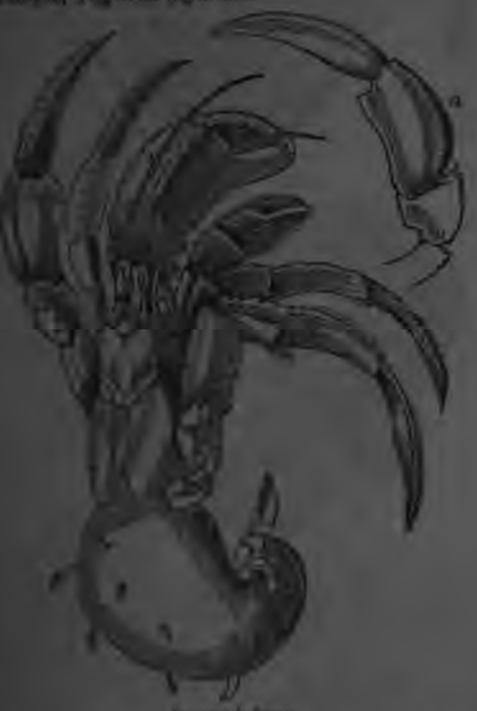
Locality.—Mediterranean sea.

Four other species belong to this subsection.

B. Ocular peduncles reaching beyond the basilary portion of the external antennæ.

b. No rostriform prolongation on the anterior border of the carapace.

Example, *Pagurus deformis.*



Pagurus deformis.

a, one of the anterior claws; the outer side of which is towards the spectator.

Description.—Ocular peduncles very stout and short, rather longer than the basilary portion of the external antennæ, but much shorter than the anterior border of the carapace; cornea large, and occupying half the length of the terminal joint of the ocular peduncles. Anterior feet short and stout, especially on one side, smooth externally, but spiny above; a denticulated crest on the upper border of the larger moveable finger. Succeeding feet smooth, and with but little hair, furnished externally with a projecting crest, which extends over the two first joints, and which, in the third foot, is very much developed and finely denticulated. Nothing similar on the opposite side. Abdomen furnished with four large transverse plates, each with an oviferous false foot; the three first of these are large, and terminated by three elongated and ciliated laminæ in the female. In the male, all these appendages are small, and terminated by a single lamina. Length 5 inches.

Locality.—The Isle of France and the Seychelles.

Six other species are arranged by M. Milne Edwards under this subsection, besides *Pagurus sanguinolentus* (Quoy and Gaim.), which he believes to be merely a variety of *Pagurus guttatus*, and not to differ from the *Pagurus Hungarus* figured by Herbst, pl. 22, f. 6.

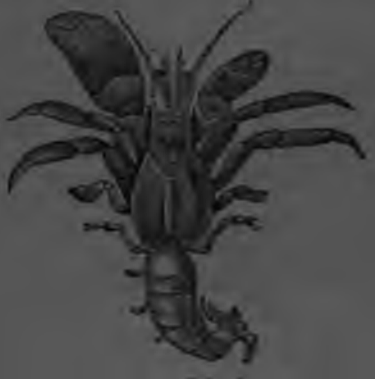
b. Anterior border of the carapace armed on the median line with a more or less projecting rostral tooth

c. No pairs of appendages on the anterior part of the abdomen.

Example, *Pagurus oculatus.* Rostriform tooth scarcely developed. Ocular peduncles shorter than the peduncular portion of the internal antennæ, but longer than the anterior border of the carapace, and with their basilary scales small, curved, nearly oval, and approximated. Anterior feet nearly symmetrical and moderate; manus spiny, and furnished with some hairs, the large fingers nearly cylindrical, and terminated by a black nail. Second and third pair nearly cylindrical, furnished with some bundles of short and scattered hairs, and terminated by a styliform tarsus much shorter than the penultimate joint. No pairs of appendages at the base of the abdomen of the male; false feet small, and four in number, with a single terminal lamella. Length two inches; colour reddish; on the tarsi are yellow and red longitudinal lines.

Locality.—Noirmoutiers. (M. E.)

Ten other species are arranged under this subsection, and *Pagurus Chilensis*, one of these, which is nearly allied to *Pagurus elegans*, and inhabits the coast of Chili, is here figured.



Pagurus Chilensis.

c c. Abdomen, with one or two pairs of appendages under its base.

Example, *Pagurus maculatus.* Rostriform tooth delicate and elongated. Ocular peduncles rather narrowed towards the middle, longer than the anterior border of the carapace, and reaching a little beyond the basilary portion of the internal antennæ. External antennæ of moderate length. Anterior feet short, thick, and finely granulated; manus convex at its base, but becoming nearly triangular towards the upper part, furnished above with a small spinous crest, and having a second crest on its lower border; fingers stout, triangular, pointed, and touching each other on a straight edge; two succeeding feet very much compressed and denticulated on their upper border; their last joint nearly lamellar, falciform, and of moderate length; penultimate joint of the fourth pair not prolonging itself much above the tarsus, which is conical and moveable. Abdomen of the male with a pair of short, stout, and lamellar appendages on its anterior and lower part; these appendages are applied against the genital orifices, and are succeeded by a second pair equally symmetrical, but slender and filiform; three false feet, terminated by a simple lamella, are fixed on the left side, as ordinarily; abdomen of the female with one pair of false rudimentary feet, applied against the base of the thoracic feet of the first pair, and followed by four ovipamous appendages, the three first of which, fixed to longitudinal and narrow laminæ, terminate by two lamellæ, and are covered by a large latero-inferior fold of the skin of the abdomen, which constitutes a concave blade, ciliated on its edge and directed forwards for the lodgement of the eggs;

the fourth filament is simple and does not appear to afford attachment to the eggs.

Locality.—The Mediterranean Sea. (M. E.)

Four other species are arranged under this subsection by M. Milne Edwards.

§§ Species having the ophthalmic ring armed above with a moveable rostriform tooth, which advances between the ocular peduncles, and is denticulated on its edges.

Example, *Pagurus Miles.*

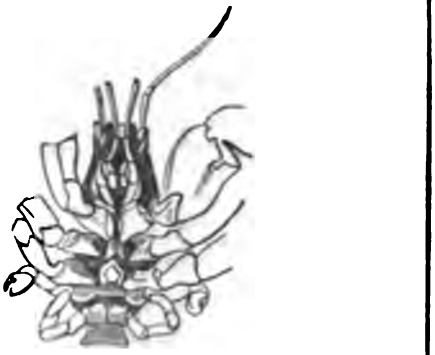
Description.—Ocular peduncles moderate, not reaching remarkably beyond the penultimate peduncular joint of the internal and external antennæ; their basilary scales large, flat, and applied against the rostriform prolongation. Anterior feet very unequal; that of the left side very strong and entirely covered above by more or less acute spines. Succeeding feet granulous and spiny above, their tarsus very long, with a trenchant edge, furrowed externally, and armed above with spines. Abdomen of the male with four rather large false feet, terminated by a long simple lamella. Length about three inches; colour yellowish.

Locality.—Coasts of India. (M. E.)

Two other species are arranged by M. Milne Edwards under this subsection.

Cenobita. (Latreille.)

This genus, in the opinion of M. Milne Edwards, establishes the passage between the *Paguri*, properly so called, and *Birgus*. The abdomen is conformable with that of *Pagurus;* the antennæ resemble those of *Birgus;* the *carapace* is equally characteristic, for it is much more solid than it is found in the *Paguri*, is narrowed and compressed forward, and presents in its posterior half a projecting border, which separates its upper surface from the lateral portion, which descends vertically towards the feet.



Under side of carapace, &c. of Cenobita.

The *ocular peduncles* are rather short, but large and compressed, so as to be nearly lamellar; the cornea occupies the terminal and external portion. The *internal antennæ*, inserted a little behind the external ones, are extremely large; their first joint, large at the base and cylindrical, reaches beyond the eyes, and has a second joint still longer; the third joint is rather longer than the second, and supports two terminal filaments, one of which is short and setiform, the other stout, rather long, and obtuse. The *external antennæ* are very much compressed, their peduncle is long, but does not reach the extremity of the second joint of the internal antennæ, and their palp is only represented by a small rudimentary tubercle. The *external jaw-feet* are pediform, short, nearly cylindrical, and devoid of teeth toward their base. The anterior feet are stout, unequal, and terminated by a short manus, which is compressed internally. (See the cut below, figure *b*.) The second and third pair are large, but present nothing remarkable; the fourth pair are nearly rudimentary, and their last joint has the form of a small tubercle, scarcely moveable; the fifth pair are formed as in *Pagurus*, except in the male, where their basilary joint presents a tubular prolongation more or less extended, at the extremity of which is the generative apparatus. The *abdomen* is membranous and rolled upon itself, as in the *Paguri*, but is shorter. In the female it has, on the left side, three rather large false oviferous feet fixed to the dorsal plates; further backward is a fourth horny plate without any appendage. At the extremity of the abdomen is a dorsal horny segment, with a median lamina on its posterior border, and on each side an appendage, that of the right side being much the smallest; the form of these appendages is the same as in the *Paguri*. In the male all these abdominal appendages, with the exception of the terminal pair, are completely wanting; but dorsal horny plates indicate the division of the abdomen into rings.

The Cenobites, which are all the inhabitants of warm climates, are thus divided by M. Milne Edwards.

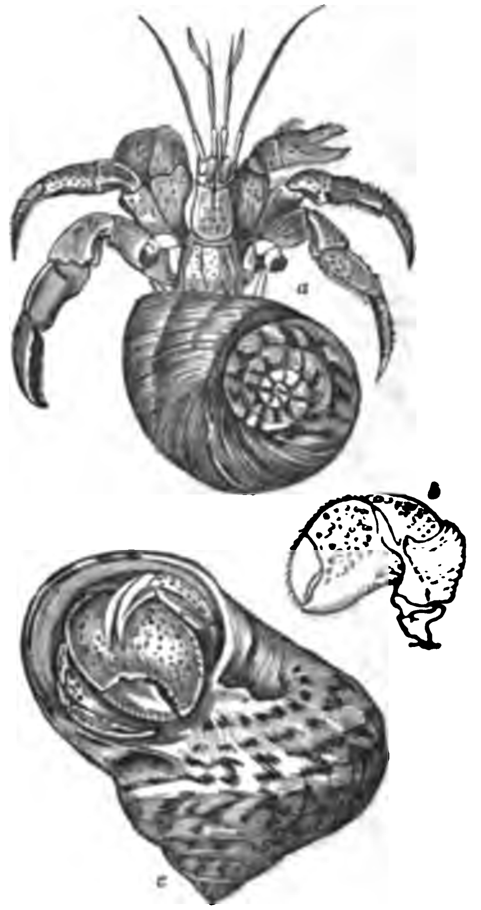
§ Species having the ocular peduncles nearly cylindrical, rounded on the upper border, and terminated by a hemispherical cornea which reaches beyond the prolongation of the peduncular joint received into the notch of its upper border.

Example, *Cenobita Diogenes.*

Description.—Stomachal region hardly convex. Ocular peduncles only of the length of the anterior border of the carapace, and nearly triangular; their basilary scale moderate and oval; tarsi very short; a trenchant and very projecting crest on the lower edge of the two last joints of the third left foot. Length about three inches; colour, especially of the large claw, red or violaceous.

Locality.—The Antilles.

Only one other species is placed by M. Milne Edwards under this section.



Cenobita Diogenes.

a, Partially out of shell, showing the arrangement and structure of the antennæ, carapace, feet, &c. Among these last, what may be called the rough-shod pair (the fourth) are well displayed; *b*, large claw (external view). (M. E.)

c, Cenobita in shell (*Turbo Pica*), showing the disposition of the first pairs of feet when the animal has retired as far as it can, and the large claw acting as a kind of operculum to protect the aperture.

§§. Species whose ocular peduncles are very much compressed, terminated above by a rather sharp border, and support a nearly triangular cornea, which does not sensibly reach beyond the prolongation of the peduncular joint received into the notch of its upper border.

Example, *Cenobita rugosa.*

Description.—Stomachal region nearly flat; labial border of the branchial regions very projecting and slightly curved. Ocular peduncles nearly twice as long as they are high; their basilary scale moderate and pointed. Feet granulous and slightly muricated; the great claw moderate, and furnished above with a row of small, oblique, and parallel crests. Tarsi short and triangular. Upper and external edges of the two last joints of the third left foot elevated into an oblique crest. Length about three inches.

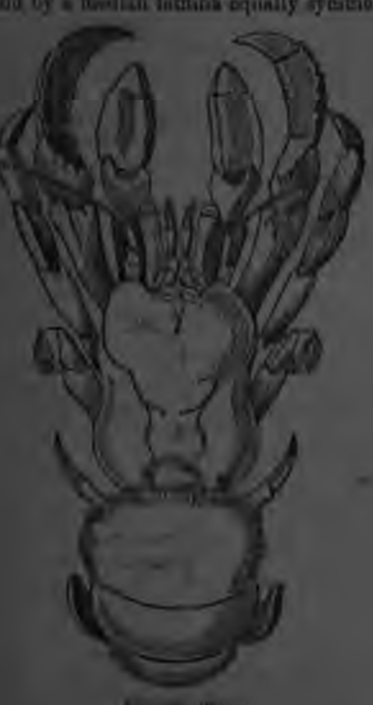
Locality.—The Indian Ocean. (M. E.)

Three other species are placed by M. Milne Edwards under this section.

Cancellus. (Edwards.)

M. Milne Edwards says of this small *generic* division, that it is but little distant from the *Paguri* properly so called, and is not as yet more than imperfectly known to him, for he had not examined the female of the only species, but the peculiarities offered by the organization of the male prevent him from referring the form to any genus already established. The *abdomen*, instead of being rolled upon itself and terminating in a sort of shapeless lobe, is perfectly symmetrical; the appendages of the penultimate abdominal ring have the same form as in the *Paguri*, but are similar on each side, and there is no other appendage adhering to the abdomen between this segment and the thorax.

Example, *Cancellus Typus*. This, the only known species, is described by M. Milne Edwards as having the rostriform tooth large, triangular, but projecting little. The anterior portion of the carapace convex and without perceptible furrows. Ocular peduncles slender, reaching beyond the peduncle of the external antennæ for nearly one-half of their length, but nevertheless shorter than the anterior border of the carapace; cornea transparent, very small, and without any notch on its superior border. External antennæ very short, hardly more than twice as long as the ocular peduncles. Anterior feet equal, and depressed above; on the upper edge of the manus a denticulated crest, which is united to a rounded longitudinal elevation on the external surface of the manus, so as to form a pyramid of three faces on the carpus; external surface of the manus a little warty; pincers very short. Second pair of feet much stouter and longer than the third, and furnished with a crest which extends from the middle of the third joint to their extremity, in describing a regular curve, the convexity of which is outwards; the upper extremity of the crest is elevated, like that of the anterior feet, pyramidically, and corresponds exactly to the extremity of the ocular peduncles, when the feet are directed forwards. Tarsi very short and rather stout. Third pair of feet very much compressed. Basilary joint of the posterior feet large and squamiform. Abdomen of the male short, large, furnished above with very narrow transverse plates, which have no appendages, and terminated by a pair of appendages as in the other Pagurians, but symmetrical, and by a median lamina equally symmetrical.



Cancellus Typus.

Birgus.

Since the article *Birgus* was written, M. Milne Edwards has published (*Histoire Naturelle des Crustacés*) some valuable observations and an elaborate description, which ought not to be omitted. This genus appears to him to establish the passage between the *Paguri* (or rather the *Cenobitæ*) and the *Lithodes*. [HOMOLIANS, vol. xii., p. 272.] Their *carapace*, terminated anteriorly by a horizontal and projecting rostrum, is divided into two portions, as in the *Cenobitæ*; the anterior portion formed by the stomachal region is narrow, but the posterior portion is very large and oval, the branchial regions being very much developed, and forming on each side a sort of semicircular buckler, which advances above the base of the feet. The *ocular peduncles* are stout, rounded, and of moderate length. The *internal antennæ* have the same conformation as in the *Cenobites*, except that their basilary joint is still more elongated. The disposition of the external antennæ and of the external jaw-feet is also entirely the same as in the last named Pagurians. The *anterior feet* are stout, rounded, and of moderate length; the two succeeding pair are terminated by a stout cylindrical joint; and the fourth pair, which are shorter than the preceding, but not elevated above them, are provided with a cheliform hand, the two fingers of which are long and cylindrical; the posterior feet, which are very short and cylindrical, are elevated under the lateral parts of the carapace, and terminated by a very obtuse rudimentary pincer. The abdomen is very large, and covered above by a small horny band, followed by four great corneo-calcareous plates, which occupy its whole width, and over-ride each other, as in the Macrurous Crustaceans. On each side of these great segments are to be seen one or two horny pieces, which seem to be the representation of the epimerian piece of the four corresponding abdominal rings. In the female, the three first of these segments, that is to say, the second, third, and fourth rings, have on each side a great false foot formed by a small basilary piece and two great narrow and ciliated appendages; these members are wanting on the right side, and in the male no trace of them is perceptible. The whole of the inferior surface of the abdomen is membranous, except that, towards its posterior part, may be seen a small quadrilateral plate, which gives attachment to a second projecting plate, and has on each side an abdominal rudimentary false foot, composed of a basilary piece and two moveable tubercles, which recal the disposition of the appendages of the sixth abdominal ring of the *Paguri*, but which is symmetrical on both sides of the body. The terminal plate is rounded at the end, covers the anus, and represents the seventh abdominal ring.

The respiratory apparatus in *Birgus* presents very remarkable peculiarities of structure. The branchiæ are fourteen in number on each side of the body, and are fixed by a peduncle situated towards the middle of their internal surface. The respiratory cavity is very large, and the branchiæ only fill the tenth part of it; its vault is carpeted below by a delicate and epidermic membrane; but this soon disappears and leaves naked the skin, which is continued with that membrane, and covered by a multitude of vascular vegetations.

For the natural history of the only species known, *Birgus Latro* (for the *Birgus laticauda*, Latr., is considered to be only the young of *Birgus Latro*), see the article BIRGUS.

FOSSIL PAGURIANS?

M. Milne Edwards is of opinion that *Pagurus Faujasii* (Desm., *Crust. Foss.*, pl. xi., f. 2) does not belong to that genus, but has much analogy with *Callianassa*. [CALLIANASSA.]

PAIMBŒUF. [LOIRE INFERIEURE.]

PAINE, THOMAS, was born on the 29th of January, 1737, at Thetford, in the county of Norfolk. His father, who was a Quaker, brought him up to his own business, that of a staymaker. At the age of twenty he removed to London, where he worked some time at his business. He then went to Sandwich in Kent, where, in 1760, he married the daughter of an exciseman, and obtained a place in the Excise, but retained it only about a year, and then became an assistant at a school in the neighbourhood of London. After leaving this situation he was again employed in the Excise, and was stationed at Lewes in Sussex. Here he had gained some reputation by various pieces of poetry, and had been selected by the excisemen of the neighbourhood to draw up 'The Case of the Officers of Excise; with Remarks on the Qualifications of Officers, and on the numerous Evils arising to the Revenue from the Insufficiency of the present Salaries,' 1772. The ability displayed in this his first prose composition induced one of the Commissioners of Excise to give him a letter of introduction to Benjamin Franklin, then in London as a deputy from the colonies of North America to the British government. Franklin advised him to go to America. He took the advice, and having settled himself at Philadelphia in 1774, became a contributor to various periodical works, and in January, 1775, editor of the 'Philadelphia Magazine.'

In January, 1776, he published in America his 'Common Sense,' which contributed in an eminent degree to make the people of that country of one mind at the time of the Declaration of Independence. Burke, in his 'Letter to the Sheriffs of Bristol,' speaks of it as 'that celebrated pamphlet which prepared the minds of the people for independence.' For this production the legislature of Pennsylvania voted him 500*l.*; the university of the same province conferred on him the degree of M.A., and he was elected a member of the American Philosophical Society. He was also made Clerk to the Committee of Foreign Affairs. During the American War he published at intervals fifteen numbers of 'The Crisis' (Philadelphia, 1776-1783), a series of political appeals intended to rouse and keep alive the public spirit.

He was obliged to resign his office of Clerk in 1779, for having divulged some official secrets in a controversy with Silas Deane, whom he accused of a fraudulent attempt to profit by his agency, in conveying the secret supplies of stores from France.

In 1781 Paine was sent to France with Colonel Lawrence to negotiate a loan, in which he was more than successful; for the French government granted a subsidy of six millions of livres to the Americans, and also became guarantee for a loan of ten millions advanced by Holland. On his return to America he was rewarded for his services by being appointed, in 1785, Clerk to the Assembly of Pennsylvania; he received from Congress a donation of 3000 dollars; and the state of New York bestowed on him the confiscated estate of Frederic Davoe, a royalist, near New Rochelle, in the state of New York, consisting of 500 acres of well-cultivated land, with a good stone house.

After the peace between Great Britain and America, Paine seems to have employed himself chiefly in mechanical speculations. In 1787 he went to France, and submitted to the Academy of Sciences at Paris a plan for the construction of iron bridges. Meeting with no encouragement, he crossed over into England, and in prosecution of his project entered into partnership with an iron-founder at Rotherham in Yorkshire, and explained the principles of his proposed construction in a letter addressed to Sir George Staunton, and printed at Rotherham in 1789. The sums which this undertaking required, together with the failure of his agent in America, involved him in difficulties, which however were only temporary.

The first part of his 'Rights of Man,' in reply to Burke's 'Reflections on the French Revolution,' was published at London, in 1791; and the second part early in 1792. An information was laid by the attorney-general against him as the author of the second part, which was designated as 'a false, scandalous, malicious, and seditious libel;' and the trial came on in the Court of King's Bench before Lord Kenyon. He was eloquently defended by Lord Erskine, then the Hon. Thomas Erskine, but the jury, without suffering the attorney-general to reply, at once pronounced him guilty. Erskine, in consequence of this defence, was dismissed from the office of attorney-general to the Prince of Wales. There are a few remarks on some of the leading principles of the 'Rights of Man' in Malthus's 'Essay on the Principle of Population,' book iv., chap. 6.

In the meantime however Paine had been chosen by the department of Calais as a member of the French National Convention, and having escaped and landed in France in September, 1792, was received with enthusiastic congratulations. He took his seat in the Convention, and when the trial of Louis XVI. came on, offended the Jacobins by voting that the king should be imprisoned during the war, and banished afterwards. He published his 'Reasons for wishing to preserve the Life of Louis Capet, as delivered to the National Convention.' Towards the end of 1793 he was excluded from the Convention as a foreigner, though he had been naturalised; and in 1794 was arrested by order of Robespierre, and committed as a prisoner to the Luxembourg.

He had finished the first part of his 'Age of Reason' just before his imprisonment: it was published at Paris under the auspices of his friend Joel Barlow. The second part was completed during his confinement; and it was published at Paris in 1795, after the author had been set at liberty on the fall of Robespierre. When the English publisher of this work was prosecuted in 1797, Erskine appeared for the prosecution, and a verdict of guilty was again pronounced. Bishop Watson's 'Apology for the Bible, in a series of Letters to Thomas Paine,' appeared in 1796.

On his liberation Paine had asserted his right to sit as a member of the Convention; and on the 8th of December, 1794, he was allowed to resume his place. About this time he gave offence to the people of America by addressing a letter to General Washington, in which he reviled him for not interfering to procure his liberation. In the course of 1795 he published at Paris 'A Dissertation on the First Principles of Government;' 'The Decline and Fall of the English System of Finance;' and 'Agrarian Justice opposed to Agrarian Law and to Agrarian Monopoly: being a Plan for meliorating the Condition of Man, by creating in every Nation a National Fund to pay to every Person, when arrived at the age of twenty-one years, the sum of fifteen pounds sterling, to enable him or her to begin the World; and also ten pounds sterling per annum during Life, to every Person now living of the age of fifty years, and to all others when they arrive at that age, to enable them to live an old age without wretchedness, and go decently out of the World.' We give the full title of this Utopian tract as a curiosity. The fund was to be created by taking, on the death of every individual, 10 per cent. of his property, as 'due to society,' and from 5 to 12 per cent. more if there were no near relations, in proportion as the next of kin was nearer or more remote. He states that this little piece was written in the winter of 1795-6.

Paine remained in France some years longer, but having written to Mr. Jefferson, who had recently been elected President of the United States, and expressed a wish to be brought back to America in a government ship, Jefferson wrote to him, and offered him a passage in the Maryland sloop of war, which he had sent to France for a special purpose. In his letter, dated March, 1801, Jefferson expresses his high estimate of Paine's services in the cause of American independence in the following words:—'I am in hopes you will find us returned generally to sentiments worthy of former times. In these it will be your glory to have steadily laboured, and with as much effect as any man living. That you may long live to continue your useful labours, and to reap their reward in the thankfulness of nations, is my sincere prayer.'

Paine did not embark for America however till August, 1802; he reached Baltimore in the following October. His first wife had died about a year after their marriage; he lived about three years with his second, whom he married soon after the death of his first, when they separated by mutual consent. During his last residence in France he had become intimate with Madame Bonneville, the wife of a French bookseller, who, with her two sons, accompanied him to America. After his return he published four or five treatises on iron bridges, the yellow fever, on the building of ships of war, &c.

He died on the 8th of June, 1809, and was buried in a field on his own estate near New Rochelle. Cobbett, some eight or nine years afterwards, disinterred his bones and brought them to England; but instead of arousing, as he expected, the enthusiasm of the republican party in this country, he only drew upon himself universal contempt. Paine bequeathed his estate and the chief part of the rest of his property to Madame Bonneville, conjointly with her husband and her two sons.

Paine, from his first starting in public life, was a republican, uniformly consistent and apparently sincere. His style is vigorous and clear, but somewhat coarse; though simple, it is enlivened with comparisons and illustrations which render it very popular and attractive. He saw clearly the weak points of any object against which he directed his attack, and accordingly he was a vigorous assailant; but he was not qualified, either by competent knowledge or by habits of patient investigation, for examining any subject in all its bearings. His merits may be briefly summed up: he was a bold original thinker, who exercised a very considerable influence on the political and religious opinions of his day, and that influence is not yet gone. What he saw and felt, he expressed clearly and forcibly. In his 'Age of Reason' he shocked the religious feeling of all

Christians by the grossness and scurrility of his language, without always convincing those who were well inclined to listen to his arguments. Such difficulties as really do exist in the gospel history could not escape his acuteness; but for want of moral knowledge he sometimes exposes himself when he thinks that he is exposing the sacred writers. The work alienated from him his friends in America, as well as in England, excited feelings of the deepest disgust and abhorrence in the whole Christian community of both countries, and exposed him to hatred and insult and calumny to such a degree as to embitter the latter years of his life, and probably to increase, if they did not produce, those habits of intemperance with which he was truly and justly charged.

PAINSWICK. [GLOUCESTERSHIRE.]

PAINTER'S COLIC, called also Devonshire colic, and colica Pictonum, from its former frequency in those parts, is a peculiar and well known variety of colic, to which lead miners, painters, and others who use that metal are subject. The symptoms are, severe pain in the belly, with obstinate constipation and occasional vomiting, which is generally followed by partial palsy, and in violent cases by apoplexy. The palsy usually affects the upper extremities, so that the arms hang powerless by the sides, the extensor muscles being the most impaired. Emaciation and paleness of the muscles affected are of very frequent occurrence.

'A first attack taken under timely management is for the most part easily made to terminate favourably. In such circumstances it rarely endures beyond eight days. But it is exceedingly apt to recur, especially if the patient return to a trade which exposes him again to the poison of lead. Sometimes the primary stage of colic is wanting, so that the wasting of the muscles and loss of power are the first symptoms.' (Christison.)

The principles to be observed in the treatment are, to remove the pain and constipation, and to obviate or lessen the remote effects. In first attacks it is not very difficult to effect the former object, but with every succeeding attack these symptoms are found more obstinate. Inflammation is rarely a primary symptom, but may ensue as in other kinds of colic. Want of power in some portion of the bowel, by which it becomes distended, and excessive contraction of another portion, are the usual conditions.

By saline purgatives, such as sulphate of magnesia, sulphate of alumina and potass, or phosphate of soda in solution, followed shortly by a large dose of opium, the constipation may be removed in the milder cases. To counteract the occurrence of inflammation, calomel and opium are preferable mostly to bleeding, in a disease where debility is one of the usual consequences. The constipation has been known to last for a month. In such a case it was customary to give the patient three or four pounds of crude mercury, in the hope that by its mechanical properties it would force a passage. Nothing is more reprehensible, as it irritates the contracted part of the bowel, and distends yet further the enfeebled and dilated part. Most cases of constipation will yield to pills of aloes and sulphuric acid, in the proportion of one drop of strong sulphuric acid to four grains of powdered aloes. Two of these pills every four or two hours will speedily remove this state.

The paralysed arms must be supported by splints. It is however of little use to cure a first attack, if the sufferer be immediately the subject of a second, which he certainly will be without the greatest care. Should he be unable to change his employment, he must be very strict in the observance of the following rules: he should never eat without first thoroughly washing the hands and face; and never take his meals in the workshop. 'Yet it is the common practice of the smelters of lead,' says Dr. Percival, 'and others also who live in the neighbourhood of smelting-mills, to broil mutton, beef, and pork steaks on the hot pigs of lead, by which the flesh acquires a peculiar agreeable flavour.' When leaving work, a different suit of clothes should be put on, and when baths are attached to the manufactory, a complete immersion in them after work, is advisable. The miners of Alston Moor derive great benefit from the saline mineral waters of [illegible] Holywell, to which they annually repair. Here, besides the chemical constitution of the waters being appropriate, an action on the bowels is ensured, and it is observed that an open state of bowels is always a great protection. On this account many masters keep a supply of castor oil on the premises, to which the workmen have free access. Fat and oily food is likewise a great safeguard. Sobriety is still more effective as a safeguard, for it is observed that among miners, potters, and all persons working among lead, drunkards suffer soonest and most severely. In all cases where the dust of the lead can be kept down by watering, this should be done, as it proves a very valuable means of exemption. Wherever it is practicable, other more innocent articles should be substituted for lead, in the various manufactures where it is now used. (Christison *On Poisons*; and Thackrah *On the Effects of Arts, Trades, and Professions*.)

PAINTING is that art of design which imitates objects by colour on a uniform surface.

As compared with sculpture, it is more extensive in the range of subjects which it is capable of treating, and more various in the modes in which it affords pleasure by such representation. Those subjects are fitted for sculpture which are sufficiently defined by form alone without the aid of colour, and which tell their story and possess unity without accessories, or, at any rate, need only accessories so few and so simple, as to be within the reach of the chisel.

The landscape or the subordinate circumstances can at best be only hinted at in sculpture; whereas in painting they are easily represented, and while they illustrate the story, enhance the effect of the picture. Simple form and character in a state of repose are the most favourable qualities for the sculptor; but passion and transient emotion, together with the external circumstances which excite them, are equally attainable by the painter. The former produces pleasure mainly by beauty of form; the latter works on the eye by the joint effect of form, light and shade, and colour.

In Egypt, painting seems to have originated in the colouring of bas-reliefs and statues: for the most part, when laid on a flat surface, the colour is free from shadow, and consists of the mere local tint, which is often conventional. The paintings executed on the walls of their tombs represent subjects of every class—battles, triumphal processions, scenes of agriculture and domestic life. A very good specimen of the latter class may be seen in the British Museum, representing a banquet. The wooden cases of the mummies are remarkable for the brilliancy of their colours. Homer, though he mentions garments elaborately embroidered or woven with figures, speaks of nothing nearer akin to painting than the colouring of the ships or the staining of ivory by a Carian woman. The origin of the art is ascribed to Corinth or Sicyon; but the name of its supposed inventor, as recorded by Pliny, is evidently deserving of little attention. Cleanthes of Corinth is said to have made the first outline; Ardices, of the same city, and Telephanes of Sicyon, to have introduced some lines within the figure; and Cleophantus to have coloured it with a single colour, and thus produced 'monochromata.' The legend of Cleophantus, or Eucheir and Eugrammus, having accompanied Demaratus from Corinth to Italy (Olymp. 30, B.C. 657), probably points to the early connection of Greek and Italian art, or to the taste for the former which existed in Etruria and the neighbouring countries, as is sufficiently attested by the innumerable vases with Greek stories and Greek inscriptions now found in Italy. The grotesqueness and clumsiness of the figures on the earlier vases, and their progressive improvement, show how little ground there is for the notion that the proportions of the human figure in early Greek art were fixed by some type derived from Egypt or elsewhere, instead of gradually developing themselves as the culture of the race advanced.

The very curious paintings on the walls of the Etruscan tombs should here be mentioned; and Pliny speaks of antient works existing in his time in a temple at Ardea, as well as at Caere and Lanuvium.

Between the 50th and 60th Olympiad (from B.C. 580 to 540) painting advanced considerably in Greece.

Historical pictures of very early events are recorded, one indeed by Bularchus, in the reign of Candaules, who died Ol. 16. 1, B.C. 716. Cimon of Cleonae invented 'catagrapha,' that is, figures seen obliquely from above or below, and thus applied the rules of perspective. The peculiarities of drawing of this early period are best learned from the study of the antient vases; the forms and protuberance of the muscles are exaggerated, and the positions strained and unnatural.

Polygnotus of Thasos, who probably settled at Athens about Ol. 79. 2 (B.C. 463), was the first painter of great excellence, and the founder of what may be called the

Athenian school. Aristotle (*Poet.*, vi.) calls him ἀγαθὸς ἠθογράφος, 'successful in his expression of character;' and Pliny speaks of him as having abandoned the old stiffness, and having given movement to the features—'instituit os adaperire, dentes ostendere, vultum ab antiquo rigore variare.' His transparent drapery is also mentioned. Pausanias (x., 25-31) describes his pictures in the Lesche at Delphi—the Capture of Troy, the Departure of the Greeks, and Descent of Ulysses to the Shades. In the Pœcile at Athens his works stood by the side of the Battle of Marathon by Panænus, the nephew or brother of Phidias, and of the Combat between the Athenians and the Amazons by Micon. This latter artist, together with Onatas of Ægina and Dionysius of Colophon, were the most celebrated contemporaries of Polygnotus.

The principles of light and shade were investigated by Apollodorus of Athens about the 94 Ol. (B.C. 404). To the school of Athens succeeded what may be termed that of Ionia, in which illusion seems to have been more aimed at. This we may infer from the well-known story of the grapes of Zeuxis and the linen cloth of Parrhasius. The former, with whom begins the second epoch of the more advanced art, was of Heraclea, and flourished about Ol. 94. (B.C. 404). His excellence seems to have been equally conspicuous in female beauty (as the Helen of Crotona), and the sublimity of Jupiter and his attendant gods.

Parrhasius was of Ephesus, and he is no less celebrated for the roundness and relief of his figures than for their exquisite form and expression. His contemporary Timanthes overcame him in one of those contests between painters which were not unfrequent in Greece, and are said to have been first instituted at Delphi in the time of Panænus. Among the antient paintings from Pompeii is one of the same subject (the Sacrifice of Iphigenia) as that of Timanthes, mentioned in Pliny, and in which the grief of the father is represented in the same way by the concealment of the face.

Another school arose at Sicyon, in which the most celebrated names were—Euphranor of Corinth (Ol. 104-110, B.C. 364-340), Pausias of Sicyon (Ol. 103, B.C. 368), Aristeides of Thebes (Ol. 102-112, B.C. 372-332), and Pamphilus of Amphipolis (Ol. 97-107, B.C. 392-352). The first of these, a sculptor as well as a painter, was laborious and consistently excellent in all that he undertook. Aristeides was remarkable for his expression of passion; Pausias practised encaustic painting with great success, having acquired the art from Pamphilus. Pliny enumerates three modes of encaustic painting—1st, without wax, with a hot point on ivory; 2nd, that in which the colours combined with wax were laid on with a stylus and burnt in; 3rd, the mode adopted for painting ships: but it is almost impossible for us to form any distinct notion of the process pursued in the two last. Pausias was noted for his children and lighter subjects, and first decorated roofs and arches with figures. Pamphilus succeeded in establishing a knowledge of the rudiments of drawing as part of a liberal education. He was moreover the teacher of Apelles, who united the softness and colouring of Ionia with the science of the Sicyonian school. His excellence in female beauty was attested by the Venus Anadyomene at Cos; his power in sublime subjects and his technical skill, by the Alexander wielding the Thunder at Ephesus. The liberality of Apelles first brought into notice a rival of his fame, Protogenes of Rhodes, or rather of Caunus in Caria. This artist excelled in a laborious study of nature, and Apelles declared that his own superiority over Protogenes consisted in his knowing when to take his hand off. They both executed numerous portraits, and Apelles was honoured with the exclusive privilege of painting Alexander the Great. Nicomachus probably preceded Apelles; he seems to have rivalled Luca Giordano in quickness of execution. Nicias of Athens, Theon of Samos, and Melanthius were contemporaries of Alexander. The first of the three was excellent in light and shade, and painted battles and historical subjects on a large scale.

The antients possessed also their painters of low and domestic subjects, their rhyparographi, of whom Pliny names Pyreicus, Calades, and Antiphilus.

At Rome, C. Fabius Pictor is said to have derived his name from decorating the temple of Health (A.U.C. 450, B.C. 304). The poet Pacuvius (B.C. 219-140) was an artist. The victory of L. Scipio over Antiochus (B.C. 190) was recorded by a picture in the Capitol, as that of M. Valerius Messala over Hiero had been by an historical painting in the Curia Hostilia (B.C. 264). The first foreign picture publicly exhibited at Rome was after the sack of Corinth by Mummius (B.C. 146), an event which brought many of the finest works of art to the conquering city, however little the victors were qualified to appreciate their real worth.

At a later period we hear of Arellius, Amulius, Accius Priscus, and Ludius, of whom the last, in the time of Augustus, painted landscapes, garden scenes, and buildings on the walls of rooms, such as we see in the ruins of Pompeii or the remains of the palace of Nero. Cæsar purchased the 'Ajax' and the 'Medea' of Timomachus for 80 talents, and at his time a school of some eminence existed at Cyzicus. The forced bloom of art which characterises the age of Hadrian implied a momentary revival of painting, and Aetion (of whom Lucian speaks so highly) must probably be reckoned as his contemporary.

It remains to say something of the general qualities of antient painting and the materials used by them. The painting of antient Greece remained dependent on architecture for a longer period than sculpture, and it seems always to have been strongly influenced by the latter art. Thus for the most part the composition of antient pictures was simple, and resembled the order of a bas-relief. A good instance of this is the well-known Aldobrandini Marriage. The figures stand separately: 'Spatiis distinguunt ne umbræ in corpora cadant.' (Quintilian, *Inst.*, viii., 5, 26.) The light was uniform, and free from those strong effects of chiaroscuro visible in many modern works; violent foreshortening was avoided. These seem to have been the *general* characteristics of antient painting, but there are exceptions to all of them. Perhaps the most remarkable one extant is the complicated and picturesque composition of the mosaic lately discovered at Pompeii, representing the battle of Issus, and probably copied from some celebrated picture. After all, the few specimens rescued from the ruins of a small provincial town cannot be expected to give us much notion of the colouring or execution of the antient masters; what their drawing must have been we are well able to judge from the vases. They studied the principles of harmony and relative proportion of colours (harmoge), as well as the general force and effect of light and shade (τόνος, splendor), which Apelles promoted by a glazing or varnish peculiar to himself.

The four colours which were the basis of the colouring of the antients down to the time of Apelles were—1, white, Melian earth, or, more rarely, cerussa, white lead; 2, red, rubrica from Cappadocia, called sinopis; 3, yellow, sil, ὤχρα, from the Attic silver-mines; 4, blacks (probably including blues), atramenta, μέλαν, from burnt plants or ivory. These were the '*colores austeri*,' to which were afterwards added the brighter and more expensive colours, 'floridi,' which were usually furnished to the painter by his employer. Vermilion (cinnabar) was called minium by the antients; what we call minium (red lead) was by them termed 'cerussa usta.'

The following is a short summary of the experiments of Sir H. Davy on antient colours from the walls of the baths of Titus and of Livia, and from other ruins at Rome and Pompeii. Some vases were also found beneath the palace of Titus containing colour, and in one of them were three kinds of red, one red-lead and the other two ochres. The yellows were ochres varied by mixing with chalk and yellow oxide of lead, 'massicot.' Orpiment (sulphuret of arsenic) is mentioned by Pliny and Vitruvius under the name of σανδαράκη, but none was found by Davy. All the blues analysed consisted of the blue frit of soda, silica, and oxide of copper invented in Egypt and made at Pozzuoli. Pliny and Vitruvius speak of Indian blue supposed to have been indigo, but none was found. The greens proved to be carbonate of copper, and in one case the green earth of Verona. No traces of the shell purple were found on the walls, but some is supposed to have been discovered in an altered state in a broken vase. The blacks agreed with the description of the antients, as being the charcoal or soot of resins. The browns were oxide of iron or ochres, or a mixture of oxide of iron and manganese. No 'cerussa' was discovered, but the whites were either carbonate of lime or fine white clay. The ground on which the colours were applied agreed with that described by Vitruvius, and consisted of powdered marble, cemented with lime, and highly polished. No traces of *wax* as used by encaustic painters were found by Davy.

Italian Schools.—The earliest professors of Christianity appear to have abstained from the use of images and the practice of the arts, bound up as they were with the abominations of heathen worship. Very little trace of Christian art is discernible before the time of Constantine, when the new religion became dominant, and could appropriate to her own purposes those means of affecting the imagination which had hitherto so effectually served her rival.

We do not of course trace that gradual attempt to improve the technical part of the arts of design which is visible among the Greeks and in the middle ages. The Christians found the shell of antient art yet remaining; the traditionary handicraft existed, but the spirit which had enlivened it was fled.

In the very early Christian works a certain tendency to symbolism and allegory is peculiarly visible. The first representation of Christ is in the character of the good shepherd as mentioned by Tertullian (*De Pudicitiâ*, cap. 10). The walls of the catacombs of Rome and Naples displayed stories from the Old Testament as types of Christ in far greater number than direct representations of scenes from the New. The subject of Orpheus was not uncommon, apparently with some mystical reference to Christianity.

St. Augustin, in the latter half of the fourth century, speaks of the sacrifice of Isaac as a common subject, 'tot locis pictum,' (*Cont. Faustum*, xxii. 73), and refers to the representation of St. Peter and St. Paul accompanying our Lord (*De Consensu Evangel.*, i. 10). Some of the most interesting remains of early art are to be found in illuminated MSS. and in mosaics. Of the former class the most remarkable is a MS. of the Book of Joshua in the Vatican Library. The execution of these miniatures is said to be very good, while the costume and the representation of towns and rivers by the personifications familiar to the ancients argues the high antiquity of the designs.

In the fifth century, the erection of sumptuous basilicas gave occasion for a great display of mosaic. In heathen times the images of the Cæsars, the only objects of universal adoration throughout the Roman world, had been placed in the tribune of these buildings; and when they were adapted to Christian worship, the colossal figure of Christ with his apostles was usually displayed on the half cupola above the altar. These representations of the Saviour and his apostles, especially St. Peter and St. Paul, bear marks of that type which may be traced back to a very early period, and which in after-times became the groundwork of the highest dignity and beauty without losing its peculiar character. Their costume is generally more or less antique, consisting of the tunic and the pallium, with sandals.

At Byzantium, the empty form of art, as of everything else, continued in all its pomp. Great mechanical skill in the use of gilding, joined to an anxious and spiritless imitation of older forms misunderstood, long continued to characterise this school, from which the church paintings of the modern Russians and Greeks are directly derived.

The Ostrogoth dominion was not unfavourable to art; at least there is a studied affectation of classical knowledge in Cassiodorus, and the mutilators of antient statues are denounced as criminals. The Lombards could have brought no art with them, and were unlikely to appreciate what they found. The most remarkable monument of their time is the large MS. of the Bible from Monte Amiata, still preserved in the Laurentian Library at Florence. The union of the church with the Frank empire gave the popes greater leisure and means, and Rome became once more a capital.

It is probable that the conquest of Constantinople by the Latins in 1204 supplied to the Italians some of that technical skill which the wild conflicts of their own parties at home had contributed to obliterate. This event was followed in a short time by the rise of the school of Siena, which has scarcely received the notice due to its early merit, owing to the fact that the history of art has been written principally by favourers of Florence.

The magnificence of the latter city replaced that of the former when the Ghibelline interest was crushed by the fall of the house of Hohenstaufen.

In San Domenico of Siena is a picture, by Guido of that city, with the date of 1221. The face of the Virgin shows traces of the type which afterwards characterised the Sienese school. Nearly contemporary with this painting were the works of Giunta of Pisa, and probably those in the Baptistery of Parma. Cimabue was born at Florence (according to Vasari, in 1240); his great picture in Santa Maria Novella is conceived with grandeur, and shows marks of the struggle then about to be made in painting. The frescoes at Assisi are particularly important for this period of the history of art.

The next great name which requires notice is that of Giotto di Bondone, born near Florence in 1276 (d. 1336). He is mentioned by Dante (*Purgat.*, xi. 94) as supplanting Cimabue in the estimation of his countrymen. What Giotto really did in art has often been mistaken. Instead of adhering religiously to the old type in sacred subjects, he directed attention more to real life, and gave to the Florentine school the practical tendency which suited the active and commercial spirit of that great republic, and which remained for a long time characteristic of the masters who followed him. It is probable too that he replaced the thick and dark-toned vehicle used by the Greeks by some more colourless medium resembling that of the early Italians; perhaps the yolk of egg and juice of young fig shoots, which is mentioned by Vasari and by Cennino Cennini, but by the former ascribed to the Byzantines. The only picture remaining which bears Giotto's name on it is that in Santa Croce. The cast of his faces is singular: the eyes are long, narrow, and placed near together; the nose of a peculiar form, and the chin projecting and angular. The most important works for the history of the Florentine school immediately after the time of Giotto are—The life of the Virgin, in the Baroncelli chapel in Santa Croce, and a portion of the paintings in the Spanish chapel of Santa Maria Novella, by Taddeo di Gaddi (b. about 1300), the godson and pupil of Giotto; some frescoes also of the life of the Virgin, by Angelo Gaddi, son of the former artist, in the cathedral of Prato; and the works of Andrea di Cione (or Orgagna, d. 1389), at once a painter, sculptor, and architect, in the Campo Santo at Pisa and in Santa Maria Novella. At Siena, Duccio di Buoninsegna contracted, in 1308, to paint the remarkable picture still hanging up in the cathedral of that city. It consists of a number of small compartments representing the life of Christ, and gives a high idea of the artist's powers of imagination and composition. Simone di Martino, whom Vasari calls Simone Memmi, and ranks among the pupils of Giotto, is by Petrarch spoken of as the rival of that master's fame, and no such connection as that of master and scholar is alluded to by Ghiberti. Lippo di Memmi worked in concert with Simone, and a joint picture with their names and the date of 1332 is to be seen in the gallery of Florence. The works of Ambrogio di Lorenzo, Taddeo di Bartolo, and others, in the palace and academy of Siena, enable us to judge of the excellence of that school at the end of the fourteenth century. Its characteristics were an adherence to old types and forms, more rigid than was practised by their Florentine contemporaries; a darker colouring in the flesh and a form of face best characterised by being contrary in every particular to that adopted in the old Cologne school—the nose is straight and disproportionately long, the forehead low, the eyes half closed and lengthened out, and the whole face oval.

At the beginning of the fifteenth century a fresh impulse was given to Florentine art, through the advances made in sculpture by Lorenzo Ghiberti (b. 1378, d. 1455), Donatello (b. 1383, d. 1466), and Luca della Robbia (b. 1388, according to Vasari). The groundwork was thus secured for profiting by the genius of the two great men, Fra Angelico da Fiesole (b. 1389, d. 1455) and Masaccio (b. 1401, d. 1443), who supplied respectively the finest feeling for the gentle and devotional affections, and a power of drawing and composition, joined with the requisite relief by light and shade. The best works of the former are to be seen in the Academia and the Gallery at Florence, and in his own convent of St. Mark in that city. A picture of great excellence from St. Domenico at Fiesole is in the Louvre. Masaccio's frescoes, jointly with those of his master Masolino and of Filippino Lippi, decorate the Brancacci chapel in the Carmelite church at Florence.

The school of Florence now produced masters of first-rate excellence, of whom the following were the principal:—Filippo Lippi (b. 1412, d. 1469), painted, besides many smaller pictures, the frescoes in the choir of the cathedral of Prato. Alessandro Filipepi, commonly called Sandro Botticelli (b. 1437, d. 1515), executed some works in the Sistine Chapel. The features of his females are in general far from beautiful, though there are exceptions, as in the picture of the Crowning of the Virgin in the Florence Gallery. Filippino Lippi was the son of Filippo Lippi (b. 1460, d. 1505). His powers may be judged of by his frescoes in

Santa Maria Novella, and by a most exquisite Virgin in a tabernacle in the open street at Prato, which, when we saw it (1834), was not even kept locked. Cosimo Roselli also worked in the Sistine Chapel, but his happiest production is a fresco in the church of St. Ambrogio at Florence, painted in 1456.

Benozzo Gozzoli was a scholar of Fra Angelico, and inherited his expression of the gentler feelings and his light clear carnations. He was moreover the first painter who delighted much in landscape and its accompaniments, a quality most remarkable in his works in the Campo Santo (painted 1469-85).

Domenico Corradi, the master of Michael Angelo, surnamed Ghirlandaio (b. 1451, d. 1495), executed some most beautiful frescoes in the Capella Sassetti in Santa Trinità at Florence and in Santa Maria Novella. He was employed too in the Sistine Chapel.

The three masters who carried the study of the naked form (hitherto but imperfect) to the highest point, towards the end of the fifteenth century, were Andrea del Castagno (d. 1480), known for the tragical story of the assassination of Domenico Veneziano after obtaining from him Van Eyck's secret; Ant. del Pollajuolo (b. 1426, d. 1498); and Verocchio (b. 1432, d. 1488): both the latter were better sculptors than painters.

All the progress of what may be called the executive part of painting, amid the bustle of a prosperous city like Florence, implies some sacrifice of the higher and purer feeling, such as had characterised the school of Siena and had attained perfection in the works of Fra Angelico.

The seeds of that devotional simplicity which were afterwards destined to unite with the greatest technical excellence in the works of Raphael, seem to have sprung up in Umbria. In this district the enthusiastic tone of the order of St. Francis and the prolonged influence of some of the Sienese masters probably paved the way for the feeling which pervades the works of Pietro Vanucci della Pieve, or Pietro Perugino, as he is commonly called (b. 1446, d. 1524). Of his education little is known: in his 25th year he visited Florence, then Rome, and finally opened a school at Perugia about the end of the fifteenth century. His earlier works are those which possess most of his characteristic merits—such as that in the Palazzo Albani, painted 1480. The Dead Christ however, painted for the nuns of Santa Chiara, in 1495, and now in the Pitti Palace, is most beautiful. The frescoes in the Collegio del Cambio at Perugia were executed in 1500.

At Bologna, Francesco Raibolini or Francia (d. 1533) painted very much on the principles of Perugino, and rivalled the simplicity and purity of the Umbrian school. In his later years he became a correspondent of Raphael and was influenced in his style by that master. Giacomo Francia imitated his father; but the most eminent pupil of Francesco was Lorenzo Costa of Ferrara. At Padua, Francesco Squarcione (b. 1394, d. 1474) and his scholar Andrea Mantegna (b. 1431, d. 1506) formed a peculiar style on the study of the antique. There is almost more of the bas-relief in their drapery and composition than is compatible with painting, and a fantastic application of antient sculpture and architecture characterises the accessories of their pictures. Mantegna's principal works are his frescoes at Mantua, his cartoons of the Triumph of Cæsar (now at Hampton Court), an altar-piece in the Louvre, and another in St. Zeno at Verona. An offshoot of the Paduan school took root at Ferrara, and to it belonged Cosimo Tura, Lorenzo Costa, and Ercole Grandi. At Naples a school had also arisen, but its works are little known. Venice gave early promise of her future greatness, and the tendency to brilliant colour was very soon visible in her artists. One family of Murano, towards the end of the fifteenth century, produced Antonio, Bartolomeo, and Luigi Vivarini. To Carlo Crivelli and Antonello da Messina (who is said to have imported into Italy the practice, if not the secret, of oil-painting) must be added the chief of the old Venetian school, Giovanni Bellini (b. 1426, d. 1516). His exquisite pictures may take their place by the side of those of Perugino: they are characterised by simple composition, pure feeling, fine full forms, and a brilliancy of colour worthy of the master of Titian. His elder brother, Gentile Bellini, who visited Constantinople (b. 1421, d. 1501), and several other masters of the school, deserve mention, particularly Marco Basaiti, Vittore Carpaccio, and Cima da Conegliano.

We have now brought up our account of Italian painting to the end of the fifteenth century, when, from the schools of Ghirlandaio, of Verocchio, of Perugino, and of Bellini, were bursting forth M. Angelo, Leonardo da Vinci, Raphael, Giorgione, and Titian. As the lives of these painters have a place under their respective names, we shall briefly touch here on their position with reference to the general history of art. Leonardo da Vinci was born in 1452, and died the year before Raphael, 1519. In the eagerness with which he explored the anatomical and scientific groundwork of his art, he anticipated M. Angelo, as he rivalled him in the varied application of his genius. It is in Leonardo that we first recognise a thorough feeling for the roundness of objects, and a greater breadth and simplicity in the masses of light and shade.

If it be true that Pietro Perugino studied in the school of Verocchio, Leonardo may have gained from him the pensive and gentle conception of sacred subjects which he combined with so exquisite a sense for beauty of form. In conjunction with Leonardo must be mentioned his fellow-pupil Lorenzo da Credi (d. 1530), who imitated his style, and painted with great tenderness and purity of feeling. Bernardino Luini (painted in 1530) has left at Milan and elsewhere many works which have been ascribed to his master. He was in every respect the most successful imitator of Leonardo. M. Angelo Buonarotti (b. 1474, d. 1563) was at once painter, sculptor, architect, poet, and musician. Educated in the school of Ghirlandaio, he attained, by twelve years' study, a thorough knowledge of the human form. His first work as a painter which attracted notice was the cartoon of the War of Pisa, executed in rivalry with Leonardo. In the frescoes of the Sistine Chapel simple grandeur characterises the prophets and sibyls: less austere beauty is visible in some of the compartments of the ceiling, and the whole is such a work as could only have been produced by the union of a painter and architect. The Last Judgment displays the greatest power, but must be admitted to want a true Christian character. The God of M. Angelo is a God of wrath, and the stern feeling of the Old Testament pervades his works. He executed very few cabinet pictures; perhapsn one that can be authenticated, except the Holy Family 'à tempera,' in the Tribune at Florence. His pupil Marcello Venusti (b. 1515, d. 1576) painted from drawings of his master, and the designs of M. Angelo supplied the groundwork for some of the pictures of Sebastian del Piombo; probably, among others, for the Raising of Lazarus, now in the National Gallery, London. His most independent pupil was Daniele Ricciarelli, or Daniele da Volterra (b. 1509, d. 1566), whose best work is the Descent from the Cross in Santa Trinità dei Monti.

Contemporary with these masters must be mentioned Baccio della Porta (b. 1469, d. 1517), commonly called Fra Bartolomeo, a Dominican monk, and the friend of Savonarola. Educated in the school of Cosimo Roselli, he appears to have profited by the works of Leonardo. His pictures are rare out of Italy: they show fine devotional feeling, rich mellow colouring, and dignity of form. The best are to be seen in the church of San Romano at Lucca and in the Pitti palace.

Andrea Vanucchi, commonly called Andrea del Sarto (b. 1488, d. 1530), was originally a pupil of Pier di Cosimo. Among his earliest works are the frescoes in the court of the Scalzo, and among his best, those in that of the Annunziata, both at Florence. His easel pictures are not uncommon; a very good and late one is the Sacrifice of Isaac, at Dresden. His forms have great breadth and simplicity. In 1518 Andrea visited France, but destroyed his own character by returning to Italy in the following year and misapplying money belonging to Francis I. M. Antonio Franciabigio and Jacopo Carucci (called Pontormo) imitated Andrea del Sarto.

Raphael Sanzio of Urbino was the son of Giovanni Sanzio, himself a painter. He was born in 1483 and died in 1520. No master ever rivalled the tenderness and sweetness of his female forms or surpassed the power shown in his larger works. The difference between his best pictures and those of other painters is one of kind rather than of degree, and the quantity which he produced in a short life is as remarkable as the fact that scarcely one of his works can be called ordinary in expression or careless in execution. In his Madonnas he enhanced the simple beauty and pure feeling of the Umbrian school. In his frescoes he rivalled the grandeur of Buonarotti, and in his portraits he surpassed the truth and individuality of Titian or Vandyke.

The pupils of Raphael were numerous, and the dispersion which followed the sack of Rome by the Imperialists in 1527, spread their works and influence far and wide throughout Italy. Giulio Pippi, or Giulio Romano (b. 1492, d. 1546), was the most celebrated of Raphael's scholars. He had executed a portion of the frescoes in the Vatican from his master's designs. After his death he executed some very remarkable ones of his own, at Mantua, particularly those representing the Fall of the Giants. His altar-piece in S. Stefano at Genoa is a very fine work. His forms are ambitious, but he wanted the pure grace of Raphael, and in his oil pictures the tone of his shadows in the flesh is more violet. Francesco Primaticcio (b. 1490, d. 1570), who painted much in France, was a pupil of Giulio. Giovanni da Udine (d. 1564) was Raphael's principal assistant in the execution of the fruits, flowers, and other objects in the arabesques of the Loggie. Pierino Buonaccorsi, or Perino del Vaga (b. 1500, d. 1547), painted at Genoa; and Gian Francesco Penni, surnamed Il Fattore (b. 1488, d. 1528), carried the principles of Raphael's school to Naples. Timoteo della Vite of Urbino (b. 1470, d. 1524), and Bartolomeo Ramenghi, or Il Bagnacavallo, came from the school of F. Francia to that of Raphael, and the latter returned to Bologna. Benvenuto Tisio, surnamed Garofalo (b. 1481, d. 1559), came from Ferrara, and carried back thither what he had acquired at Rome. His pictures are not uncommon, and often extremely beautiful in their composition and the expression of their heads. Dosso Dossi (b. 1474, d. 1558) and his brother were contemporaries of Garofalo in the school of Ferrara. Finally, among the pupils of Raphael must be reckoned the Netherlander Michael Coxis, of whom we shall speak hereafter. In the mean time a second Sienese school had arisen. Jacopo Pacchiarotto was a successful imitator of Pietro Perugino. Giantonio Razzi, commonly called Il Sodoma (b. 1480, d. 1554), seems to have been influenced by Leonardo; his forms are feminine and graceful, with considerable power of expression. His best works are to be seen in S. Domenico of Siena, and at the convent of M. Oliveto Maggiore. Domenico Beccafumi, surnamed Meccherino (b. 1549), worked with Razzi. His forms are good and his colouring pleasing. The inlaid pavement of the cathedral of Siena is principally from his designs. Baldassare Peruzzi (b. 1481, d. 1536) is better known as an architect than a painter.

To turn to the north of Italy, Antonio Allegri, or, from his birth-place, 'Correggio' (b. 1494, d. 1534), probably was instructed in the school of Mantegna, but after the death of Andrea. Nothing in the history of art seems so *premature* as the style of Correggio. His expression, to say the least of it, often borders on affectation. His early picture at Dresden shows the same colouring which he afterwards carried to such perfection. No other artist ever played with light and shadow as he was wont to do. His half tones and his reflected lights produce the effect of illusion. He knew his power, and delighted in displaying it in the conquest of difficulties from which other masters shrank. The finest works of Correggio are, the Notte and other pictures at Dresden; the St. Jerome at Parma; the frescoes in the cathedral of that city, and in the convent of St. Paul. Those purchased from the Marquis of Londonderry for the National Gallery, especially the Ecce Homo, are excellent specimens of the master. The tendency to affectation visible in Correggio was a dangerous legacy to the school of Parma, and its evil consequences are especially visible in the works of Francesco Mazzuoli, or Il Parmigianino (b. 1503, d. 1540), to whom however it is impossible to deny great power and great feeling for beauty.

The *Roman School* had cultivated beauty of form and expression, Correggio perfected chiaroscuro, and it was in Venice that colouring attained its highest pitch. We have remarked the tendency to brilliant local tints in the latter school at a very early period. Giorgio Barbarelli da Castelfranco, or Giorgione (b. 1477, d. 1511) steeped in a rich glow of mellow light those full forms of Venetian beauty which hold a middle place between the clumsiness of the Flemings and the more slender outlines of the other Italian schools. The most eminent of Giorgione's scholars was Sebastian del Piombo (b. 1485, d. 1547). His portraits are very grand, and his historical pictures, like our Raising of *Lazarus*, combine the design of M. Angelo with Venetian colour. The style of Giorgione had much [illegible] Jacopo Palma Vecchio and on his great pupil Tiziano Vecellio (b. 1477, d. 1576).

We possess in England good specimens of Titian's works, especially in the National, the Bridgewater, and Fitzwilliam Galleries (at Cambridge). The brilliancy of his high lights and the ruddy transparency of the skin in his flesh are most marvellous; his large compositions, which, like most of his countrymen, he executed in oil instead of fresco, must be seen at Venice. It is impossible to conceive more delicious landscapes than those of his backgrounds, or more reality than animates his portraits. Bonifazio (b. 1491, d. 1553), Andrea Schiavone (b. 1522, d. 1582), and Alessandro Bonvicino, called Il Moretto of Brescia (b. 1564), were distinguished imitators of Titian. Gio. Batista Moroni, an admirable portrait-painter (b. 1525, d. 1578), was a pupil of Moretto. Pordenone (b. 1484, d. 1539) and Paris Bordone (b. 1500, d. 1570) are remarkable for the softness and richness of their colouring and the expression of their heads, especially in portraits. The most productive painter of the whole Venetian school, which maintained its original character and force for a considerable period, was Jacopo Robusti, called, from his father's trade, Il Tintoretto (b. 1512, d. 1594). He painted much by lamp-light, and thus acquired a blackness in his shadows which is sometimes unpleasing, but his own facility of execution was the real bane of his reputation. Some of his works, such as the Crucifixion, in the school of St. Roche at Venice, are as large as scenes in a theatre, and his pictures are most unequal.

At Verona, Paolo Caliari, or Paolo Veronese (b. 1528, d. 1588), applied in a peculiar way the principles of the Venetian masters. The brilliancy of his banquets and festal scenes is perfectly astounding, and full effect is given to the force of his local tints and richness of his stuffs by the cool transparent atmosphere of the backgrounds. The best specimens of his works are, the large picture in the Louvre, Christ at Levi's table in the Doge's palace, and Mary Magdalen at Christ's feet in the Durazzo palace at Genoa. His son and scholar Carlo Caliari was far inferior to his father. The family of Da Ponte, from Bassano, produced three painters. Jacopo, the father (b. 1510, d. 1592), after studying at Venice, returned to his native place, and painted innumerable representations of country and household life, or sacred scenes disguised as such, in a strong and rich colouring. His two sons, Francesco and Leandro, have left some good pictures at Venice.

We have now arrived at the period when art appeared destined to decline. Venice was in some degree an exception; but at Florence, exaggerated anatomical display, the attitudes of academic models, and hard opaque colour are the characteristics of many of those masters who thought they were following M. Angelo. Such for the most part, at least in their historical pictures, were Giorgio Vasari, the historian of painting (b. 1512, d. 1574), Angelo Bronzino (b. 1501, d. 1570), and Alessandro Allori, his scholar, also called Bronzino (b. 1535, d. 1607). While Giuseppe Cesari, surnamed the Cavaliere d'Arpino (b. 1560, d. 1640), enjoyed a great reputation at Rome, Prospero Fontana (b. 1512) and his daughter Lavinia, with several other masters, were distinguished at Bologna; but the real spirit of art had fled. Empty conventional forms and facility of execution were all that remained in the place of the sterling qualities of the older masters, who were often despised as dry, harsh, and formal.

Towards the end of the sixteenth century, the re-action from the Reformation which pervaded the Roman Church began to be felt in the arts also. The Jesuits were fast recovering the ground lost in what may be called the heathen days of the papacy.

Palestrina spiritualised the music of the church, and the Carraccis to a certain extent revived the sister art of painting. The founder of their school was the uncle Ludovico (b. 1555, d. 1619), a pupil of Prospero Fontana and Tintoretto. His nephew Annibale (b. 1560, d. 1609) and Agostino (b. 1558, d. 1601) zealously seconded his efforts, and they opened an academy at Bologna. The study of the antique and of nature was united to the endeavour to appropriate the characteristic excellence of each most distinguished master—a principle from which they derived the name of the Eclectic school, and which of itself can lead to little. It appears indeed incompatible with the unity and individual feeling necessary for a work of art. They succeeded however in elevating the character of painting far above that which it bore in the hands of their immediate predecessors, and joined earnestness and devotional feeling to great technical excellence. Ludovico has the merit of being the teacher; Agostino painted less than the other two, and Annibale is without doubt the most distinguished. His frescoes in the Palazzo Farnese at Rome, and his pictures in the gallery at Bologna, especially the former, give the best idea of his real worth. From this school of the Carracci issued a series of great masters, of whom the following were the most eminent. Domenico Zampieri, or Domenichino (b. 1581, d. 1641), in whose works a thorough feeling for beauty and great strength of conception and execution are visible. His most celebrated oil picture is the Communion of St. Jerome, in the Vatican, in which however the composition is partially imitated from Agostino Carracci; his best frescoes are that in the cathedral at Fano, in St. Luigi at Rome, and those at Grotta-ferrata. Like Annibale Carracci, he was an admirable landscape-painter. Francesco Albani (b. 1578, d. 1660) painted Cupids and groups of a mythological character, which seldom rise above prettiness. His best scholars were Gio. Batista Mola (b. 1620), Carlo Cignani (b. 1628, d. 1719), and Andrea Sacchi (b. 1594, d. 1668). A very fine picture by the last master is in the Vatican. Carlo Maratta (b. 1625, d. 1713) was his scholar. Guido Reni (b. 1574, d. 1642) stands among the first of the Bolognese school. His conception of beauty, formed by a contemplation of the antique, would be more satisfactory if it possessed more individual life, and was free from the somewhat insipid sameness of a mere abstraction. In his early works he painted with great strength. The Massacre of the Innocents, the large Pietà, and the Crucifixion, in the Gallery at Bologna, belong to this period. The Aurora, in the Palazzo Rospigliosi, is of his middle style, when he painted with a warmer colouring than in his later works, in which the tone is often leaden, and the forms, though beautiful, are vague and spiritless. Gio. Francesco Barbieri, surnamed Guercino da Cento (b. 1590, d. 1666)) showed perhaps greater power of expressing passion than Guido, and was less attracted by an ideal type. In his early works there is a force and fullness of shadow, which was exchanged afterwards for a lighter and milder manner. His St. William at Bologna, and St. Thomas in the Vatican, are good specimens of the former; the Abraham and Hagar, at Milan, of the latter style. Guercino holds a sort of intermediate place between the Eclectic school and the Naturalists. In the hands of Lanfranco (b. 1581, d. 1647) painting again degenerated into a mere handicraft, with great exaggeration, but little real expression. Gio. Batista Salvi (b. 1605, d. 1685), called from his birthplace Sasso-ferrato, is supposed to have been a pupil of Domenichino. His pictures have no great depth or force, but show considerable beauty without affectation.

Another Eclectic school, that of the Procaccini, arose at Milan, which produced, among other masters, Gio. Batista Crespi (b. 1557, d. 1653) and his son Daniele. At Rome, Federigo Baroccio of Urbino (b. 1528, d. 1612) imitated the style of Coreggio. His best followers were Ludovico Cardi da Cigoli (b. 1559, d. 1613), and Cristofano Allori, a son of Alessandro (b. 1577, d. 1621). The Judith of the latter, in the Pitti, is a very fine picture. Carlo Dolci (b. 1616, d. 1686) followed much the same course as Sasso-ferrato, but not always with as little affectation. A high finish and smooth cold colour often hold the place of higher qualities. Pietro Berettini da Cortona (b. 1596, d. 1669) laid the foundation of that empty mannerism in Italian art which prevailed through the latter part of the seventeenth and the whole of the eighteenth century.

Opposed to the Eclectic schools were those masters who seem to have imagined that a true imitation of nature consisted in appropriating to every and any subject the first forms which came in their way, instead of selecting such as thoroughly suited the conception of the particular scene to be treated, and imitating those as closely as possible—too closely it cannot be. The vague notion of the ideal on the one hand and of indiscriminately copying vulgar nature on the other, are opposite and equally fatal errors. The leader of the 'Naturalists' was Mich. Angelo Amerighi da Caravaggio (b. 1569, d. 1609), whose force of execution was very great, and who often rose to real pathos in his expression. Among his scholars were two Frenchmen, Valentin and Vouet. At Naples, where the 'Naturalists' opposed in the olent manner all encroachments of the other school, e Ribera, or Lo Spagnoletto (b. 1592, d. 1656), has Martino a masterly Descent from the Cross. There much that reminds us of his native country. He was dark and powerful in his shadows, and shrank from the representation of no scene however horrible. Salvator Rosa (b. 1615, d. 1673) was a man of most varied powers. His landscapes (often wild scenes in the Apennines) and his battle-pieces are best known and superior to his historical pictures. Luca Giordano, surnamed 'Fa Presto' (b. 1632, d. 1705), may be considered as closing the seventeenth century. We ought to mention that at Venice during that period, though art undoubtedly declined, still much that is good may be found in the works of Jacopo Palma the younger (b. 1544, d. 1628), and in those of Alessandro Varotari, or Il Padovanino (b. 1570, d. 1650). In the eighteenth century Antonio Canale (b. 1697, d. 1768) and his nephew Bernardo Bellotto or Canaletto (b. 1724, d. 1780) executed those well-known views which have never been exceeded for truth and out-door effect.

Northern Schools.—Illuminated MSS. still remain as monuments of German art in the ninth and tenth centuries. The marriage of Otho II. (978-983) with the Greek princess Theophania probably gave the German artists access to the technical skill of the Byzantines. Towards the end of the twelfth and beginning of the thirteenth centuries visible signs of new life in art begin to show themselves. In the 'Parcival' of Wolfram von Eschenbach, who lived early in the thirteenth century, the painters of Cologne and Maestricht are especially mentioned, and the figures of the Apostles, one of which bears the date 1224, in the church of St. Ursula in the former city, are probably the oldest German pictures extant. In the reign of Charles IV. (1346-78) artists seem to have existed in Bohemia; but towards the close of the fourteenth century the school of Cologne was the most distinguished. Meister Wilhelm is spoken of by a contemporary chronicler, in 1380, as the best master of his day. Pictures of his are to be seen in St. Castor at Coblenz, St. Clara in Cologne, and in the Boisserée collection. The great altar-piece, formerly in the chapel of the town-hall, now in the cathedral of Cologne, is supposed to have been painted by Meister Stephan, and bears the date 1410. The richness of the colouring rivals that of Giorgione, and the dignity and beauty of the Virgin are most remarkable. A branch of the Cologne school appears in Westphalia in the beginning of the fifteenth century. No connection has been traced between the German and old Flemish masters, though such probably existed. Hubert and John van Eyck (b. 1366, d. 1426, and b. 1400, d 1441) united the majestic simplicity of the old Christian type with a close imitation of external nature and a homely strength characteristic of their country. Their sister Margaret also was an artist. John van Eyck may be said to have 'republished,' though he probably did not invent painting in oil. The great work of the two brothers was the altar-piece in St. Bavo at Ghent, painted for Judocus van Vyt. It consisted of a centre picture of the Worship of the Lamb, surmounted by God the Father, the Virgin, and St. John, and flanked by folding shutters, all relating to the principal subject. The different parts of this painting, unquestionably one of the grandest productions of modern art, are now separated. The upper and middle portions remain at Ghent; the others are at Berlin. Michael Coxis executed a copy of it for Philip II., which is still more scattered. The school of Van Eyck was fertile in good painters; among them were Gerard van Meeren, Hugo van der Goes (some of whose pictures are to be found in Italy), Roger van Brügge, and more especially his pupil Hans Hemling or Memling. Some beautiful works of this last master are preserved in St. John's Hospital at Bruges, of which he was an inmate about the year 1479. Towards the close of the fifteenth century we find a kindred school to that of Flanders existing at Cologne; and the same feeling may be traced in the engravings and pictures of Martin Schoen, or Schöngauer of Colmar, who painted about 1460. Hans Holbein the elder, of Augsburg, worked about 1500, but it was at Nürnberg that the German school displayed its full power. Michael Wohlgemuth, of that city (b. 1434, d. 1539), was the master of Albert Dürer (b. 1471, d. 1528), a painter who scarcely shrinks from comparison with any of his great Italian contemporaries.

The earliest undoubted picture of Dürer's is his own portrait in the Florence Gallery; among his latest and most assuredly his finest works are the Apostles, now in the Munich Collection. In 1506, Dürer visited Venice, but the Venetian school does not seem to have exercised so much influence over him as that of Flanders probably did in a journey undertaken at a later period (1520-1). Of Dürer's excellence as an engraver we need not speak here. The principal artists of the Nürnberg school, after its great leader, were Hans v. Kulmbach, Henry Aldegrever, Bartholomew Beham, Albert Altdorfer, and George Pens. The last became a pupil of Raphael. In Saxony, Lucas Cranach (b. 1472, d. 1553) was court painter to the three electors, Frederic the Wise, John the Steadfast, and Frederic the Magnanimous. He accompanied the first to the Holy Land in 1493, and shared the prison of the last after the battle of Mühlberg (1547). At a later period he was burgomaster of Wittenberg and a friend of Luther, whose marriage with Catherine von Bora he contributed to bring about. His pictures are fanciful, and the features of his females much similar. Lucas Cranach, the son, was also a painter. In Holland we ought to notice Cornelius Engelbrechtsen (b. 1468, d. 1533), and his more celebrated pupil Lucas of Leyden (b. 1494, d. 1533); and we must close our notice of the old German school with Hans Holbein the younger (b. 1498, d. 1554), who came from Basle to England, where he died in the service of Henry VIII. Most of his portraits remain in this country. The Dresden Gallery possesses a beautiful picture by him of the Virgin and Child, with the family of Jacob Meyer of Basle kneeling at her feet.

In looking at the general character of the old German masters, we see a vigour of conception and power of technical execution equal to any exhibited by the Italians; but they are the 'Romantic' school contrasted with the 'Classic.' The medium through which they saw nature was more tinged with the individual and national peculiarity of each artist; and there is visible in almost all their works a certain whimsical and *fantastic* feeling totally different from anything to be seen in the old Florentine or Sienese painters. We must pass briefly over Quintin Messys, the blacksmith of Antwerp (b. 1466, d. 1529), whose Misers at Windsor are well known. The later works of John Mabuse (b. 1499, d. 1562) and the pictures of Michael Coxis (b. 1497, d. 1592) show that forced imitation of the Italians which characterises the transition from the old Flemish to the school of Rubens. This tendency is more strongly marked in Franz Floris (b. 1520, d. 1570), in the elder and younger Franks (b. 1545, d. 1616; b. 1580, d. 1642), in Bernard van Orley (b. about 1470), and Otho Venius (b. 1556, d. 1634), the master of Rubens. The works of these artists and their contemporaries are deficient in independence and genuine beauty, though they interest us as being the groundwork of the school of Rubens.

The Spanish Netherlands, rescued from Protestantism by Don John of Austria and the prince of Parma, witnessed, in the commencement of the seventeenth century, a revival of painting more striking perhaps than that effected by the Caracci. Peter Paul Rubens was born at Cologne in 1577, and died at Antwerp in 1640. After leaving the school of Otho Venius, he visited Italy, and studied particularly the works of Titian and P. Veronese. His earlier pictures are more attractive than those which were executed when the ever-increasing number of commissions obliged him to employ unsparingly the pencil of his pupils. The 'Descent from the Cross,' in the cathedral of Antwerp, and its companions, are deservedly cited as among the best specimens of this master. His works may be studied in the greatest perfection in the museum and church of Antwerp, in the gallery of Vienna, and more especially at Munich. In our own country, the Blenheim collection is peculiarly rich in first-rate pictures by Rubens. He is equally great in history, in landscape, and in portrait. To complain that the fire of his genius was not chastened as in the great Italian masters, is to wish that the artist had been a different individual from what he was formed to be. When we look at Rubens's works, their facility of execution, their energy, and their brilliancy hurry us beyond such considerations; when we think of them, we may regret that his forms are often ill-selected, and that the brute animal vigour of his bacchanals is pushed to coarseness.

The most celebrated of the pupils of Rubens was Antony van Dyck (b. 1599, d. 1641). At first he imitated closely the peculiarities of his master, but after his residence in Italy he adopted a more tranquil tone of feeling and soberer colour. His historical pictures are very fine, but not equal in every way to the numerous and admirable portraits, many of which were executed during a residence in England, and still remain in this country.

Of the other scholars of Rubens, few did more than imitate and sometimes exaggerate the outward characteristics of their leader. The best among them were Jacob Jordaens (b. 1594, d. 1678) and Gaspar de Crayer (b. 1585, d. 1669).

In Holland, Michael Mirevelt (b. 1567, d. 1641) and Franz Hals (b. 1584, d. 1666) painted history and portraits, especially the latter, with great success. Bartholt van der Helst (b. 1613, d. 1670) approached very closely to Vandyck in colour. His finest work, the Festival given by the Burgher-guard of Amsterdam on the conclusion of the treaty of Westphalia, is in the museum of that city. Another excellent picture of smaller dimensions is in the Louvre.

The great master of the Dutch school however was Paul Rembrandt van Ryn (b. 1606, d. 1674). In his portraits and ideal heads we find the most wonderful truth and dignity, but his peculiar power consisted in a mastery of light and shade, which rendered the lowest subjects vehicles for high and poetical feeling. The depth and brilliancy thus produced seem hardly attainable by mere colour on a flat opaque surface, and when we look at his numerous etchings, we marvel still more how his needle on the copper has almost surpassed his pencil on the canvas. Conscious of his power to attain sublimity by light and shade alone, he seems often to have rejoiced in showing how that one charm could make us heedless of coarseness of conception and meanness of form. Rembrandt's principal pupils and imitators were Gerbrand van den Eeckhout (b. 1621, d. 1674), Ferd. Bol (b. 1611, d. 1681), who excelled in portrait, Nicholas Maas (b. 1632, d. 1693), and Salomon Koning (b. 1609). Of another pupil, Gerard Dow, we shall speak immediately.

It is necessary just to mention Gerard Honthorst, called by the Italians Gherardo delle Notti (b. 1592, d. 1660), who imitated Caravaggio and the Italian 'Naturalists.' His effects of torch and candle light are much celebrated. Gerard Lairesse (b. 1640, d. 1711) is best described as a Flemish imitator of Nicolas Poussin. Adrian van der Werff (b. 1659, d. 1722) has little to recommend him besides a finish and smoothness of surface, to which higher qualities are sacrificed; his human figures present the texture of ivory rather than of flesh, with much affectation and little genuine expression of passion or character.

We must now turn to those masters who are most distinguished in what is called 'Genre,' a word for which it is difficult to find a substitute and still more difficult to furnish a definition. The subject may be real or fictitious, but if the picture is on a small scale, and the object of the artist has been the expression of humour, or the prettiness of colour, or of light and shade; if those qualities which are accessories in great works have been to him ends, then it seems to come within the negative class, designated by the French word used above. It is the popular side, the every-day life of art, as contrasted with the epic grandeur of historical or the enthusiasm of devotional works.

Peter Breughel the elder (b. 1510, d. 1570) was called Boor-Breughel, from the subjects of many of his pictures, as his son, Peter Breughel the younger, obtained the name of Hell-Breughel, from the fantastic scenes which he portrayed. The Temptation of St. Anthony was in like manner a favourite subject of the elder Teniers (b. 1582, d. 1649), who by no means equalled his son and pupil David Teniers (b. 1610, d. 1690) in those scenes of merry-making and peasant life for which he is so celebrated. Nothing can surpass the reality of the vulgar *comfort* with which his single figures sit and smoke, or the drunken gaiety of his larger assemblies. His colour is cool and his touch firm and vigorous. Sometimes he amused himself with imitating the works of masters of a different cast. In Adrian van Ostade (b. 1610, d. 1685) we have the same subjects treated in a warmer and more mellow tone, but perhaps with less individual truth and character, though with greater attention to general effect, than by Teniers. Isaac van Ostade painted fewer interiors, and followed his brother's style, with less success. The humour of Adrian Brouwer (b. 1608, d. 1640), who is reported to have mixed deeply in the scenes which he painted, is of a broader cast. In Jan Steen (b. 1636, d. 1689) there are satirical touches and a genuine comic unity which equal Hogarth. The picture in the Duke of Wellington's gallery is an excellent specimen of these qualities. There is another department of 'Genre,' which bears the same relation to the drinking-bouts of Teniers or Brouwer that genteel comedy does to broad farce. In this Gerard Terburg and Gerard Dow stand pre-eminent. The former (b. 1608, d. 1681) threw into the scenes which he represented a delicacy of feeling and a sort of decorum which add greatly to the value of his execution and high finish. Of this kind are the celebrated Satin Gown, engraved by Wille, the Trumpeter at Munich, and the Cavalier and Lady in the Louvre. Gerard Dow (b. 1613, d. 1680) was the pupil of Rembrandt, from whom he gained a thorough knowledge of light and shade, and a feeling for general effect which preserved his elaborate execution from all tediousness, while he secured by it a wonderful reality in the household scenes which he delighted to paint. In some of his pictures, as in that of the Dropsical Lady, there is great pathos. Gabriel Metzu (b. 1615, d. 1658) was the best imitator of Terburg. Franz Mieris, a scholar of Gerard Dow (b. 1635, d. 1681), equalled his master in fineness of finish, but not in genuine feeling. Caspar Netscher (b. 1639, d. 1684) and Eglon van der Neer (b. 1643, d. 1703) painted in the same style. The interiors of Peter van Hooghe (b. 1659, d. 1722) are remarkable for magical effects of light.

The great Italian painters Giorgione and Titian were admirable in landscape. Annibale Caracci and Domenichino have left excellent pictures in this department. But as if the ugliness of the country stimulated its natives to study all the aids which make an ordinary scene picturesque, it was in Flanders and in Holland that landscape painting was most cultivated. In the school of Van Eyck, the backgrounds are often elaborately imitated from nature: Joachim Patenier (b. 1487) and Herri de Bles (b. 1480, d. 1550) executed works in which the landscape claims an independent existence and the figures have already become accessories. John Breughel, or 'Velvet-Breughel' (b. 1569, d. 1625), copied with wonderful minuteness all the variety of vegetation. Contemporary with Annibale Carracci there lived at Rome a Flemish artist, Paul Bril (b. 1554, d. 1626), who forms a sort of link between the landscape painters of the north and south.

In that kind of landscape the excellence of which consists in grandeur and the form of the large masses, Nicolas Poussin led the way. He was followed by Gaspar Dughet, or Poussin (b. 1600, d. 1663), and Sebastian Bourdon (b. 1616, d. 1671). Claude Gelée was a native of Lorraine (b. 1600, d. 1682); he was the first educated by A. Tassi, a scholar of P. Bril, but nature, and nature alone, taught him to tinge his graceful forms of foliage and his rippling water with the cool pearly hue of morning or the rich glow of an Italian evening. His pictures acquired in his lifetime the value which they have ever since maintained.

The style of Claude reacted on the Low Countries. Hermann Swanevelt (b. 1620, d. 1680) was his pupil: John Both (b. 1610, d. 1651) and Adam Pynacker (b. 1621, d. 1673) were painters of the same character. The Dutch landscape painters kept closer to Northern nature: such are the works of John van Goyen (b. 1596, d. 1656); generally low sea coasts, executed in a brown transparent tone. Anthony Waterloo (b. 1618, d. 1660) is better known by his admirable etchings than by his pictures.

The genius of Rembrandt exercised considerable influence over landscape. But the leaders of this particular school were Jacob Ruisdael (b. 1635, d. 1681) and his pupil Mindert Hobbema (b. 1611). The best works of these masters carry us into the depth of the forest and convey that sort of lonely feeling which retired woodland scenery imparts. Albert Everdingen (b. 1621, d. 1675) gave his pictures more of the Norwegian character, and often painted waterfalls and pine-forests.

We have said nothing of the pastoral side of landscape, in which Nicolas Berghem (b. 1624, d. 1683), Albert Cuyp (b. 1600), Carl du Jardin (b. 1640, d. 1678), and Adrian van der Velde (b. 1639, d. 1672), excelled. Philip Wouvermans (b. 1620, d. 1668) pursued a line peculiar almost to himself, or in which at least he has no rival. He executed battles, fairs, halts of cavalry, and all scenes in which horses occur, with exquisite truth and delicacy.

The most eminent marine painters were Bonaventura Peters (b. 1614, d. 1652), Ludolf Backhuysen (b. 1631, d. 1709), and William van der Velde (b. 1610, d. 1693). Franz Snyders (b. 1579, d. 1654), John Fyt (b. 1625, d. 1700), and John Weenix (b. 1644, d. 1719), painted animals. The first of the three executed large hunting-pieces in conjunction with Rubens.

Spanish School.—The Flemish masters, as might be expected, seem to have exercised an early influence in Spain, especially two, known as Maestro Rogel (1445) and Juan Flamenco (1496), who are supposed by some to have been Roger van Brügge, a pupil of J. van Eyck, and John Hemling. The works of Luis de Morales of Badajoz (d. 15[illegible]) show some traces of early Flemish minuteness and hardness, with great power of expression, occasionally exaggerated. Fernando Gallego imitated Albert Dürer. Antonio del Rincon (b. 1446, d. 1500), Alonso Berruguete (b. 14[illegible], d. 1562), Pedro Campaña, a Fleming by birth (b. 1503, d. 1580), Luis de Vargas (b. 1502, d. 1568), and Vicente Joanes of Valencia (b. 1523, d. 1579), were the earlier Spanish masters of eminence who studied in Italy.

The works of Rincon are rare: there is an altar-piece of his at Robledo de Chavela, not far from the Escurial. Campaña's Descent from the Cross, and the celebrated Gamba of Vargas, are in the cathedral of Seville. The series of the Martyrdom of St. Stephen, by Joanes, is in the museum of Madrid. Alonso Sanchez Coello (d. 1590) and Juan Fernandez Navarrete el Mudo (b. 1526, d. 1[illegible]) painted respectively portraits and sacred subjects for Philip II. The colouring of Navarrete is very fine, and resembles that of the Venetian school.

In the school of Seville, in the seventeenth century, the principal forerunners of Murillo were Juan de las Roelas (b. 1558, d. 1625), whose finest picture is perhaps the Death of St. Isidore, in the church of that saint (1833) at Seville; the two Herreras, and Francisco Zurbaran (b. 1598, d. 16[illegible]). The elder Herrera (b. 1576, d. 1656) is distinguished for vigour and boldness of execution. Zurbaran's great work of St. Thomas of Aquino, formerly in the Colegio de San Tomas, will bear comparison with the best pictures of any master. Bartolomé Esteban Murillo (b. 1618, d. 1682) has left early pictures at Seville which give little promise of his subsequent excellence. It was only after his return from Madrid in 1645 that he attained that freedom and power which characterise his best works. The name of Murillo is supposed in this country to stand highest in the Spanish school, but we are of opinion that Diego Velasquez de Silva (b. 1599, d. 1660) was the greater man of the two. His portraits are inimitable: his historical works in the Madrid Gallery, such as the Surrender of Breda, and his sketches of landscape in the same collection, are of great excellence. One of his most celebrated early pictures is the Water-carrier, now at Apsley House.

Alonso Cano of Granada (b. 1600, d. 1667) painted with a fine feeling of simplicity and beauty. Francisco Ribalta (b. 1551, d. 1628) is generally held to be the best master of the Valencian school. The altar-piece in the chapel of Magdalen College, Oxford, is probably by him. Claudio Coello (d. 1693) is one of the last Spanish masters who deserve notice. His picture in the Sacristy of the Escurial is a first-rate work.

French School.—Leonardo, Andrea del Sarto, Rosso, and Primaticcio were among the Italians whom the zeal of Francis I. introduced into France; but we find little independent existence of French painting before Simon Vouet (b. 1582, d. 1641), who studied the later Venetian painters and Caravaggio: his contemporary Nic. Poussin (b. 1[illegible], d. 1665) stamped a character on the art of his country, which may be said to have lasted to our own days. His style is based in some degree on a confusion of the capabilities of sculpture and painting—statuesque forms, [illegible] drawing, and the composition of a bas-relief clothed in [illegible] pleasing colour, though not wholly satisfactory to the eye, still combine to produce considerable effect; an effect however of a limited kind, analogous to that resulting from the classical correctness of Racine's tragedies. Gaspar Poussin and Claude Lorrain have been already named. The best of Vouet's scholars was Eustache Le Sueur (b. 1617, d. 16[illegible]). Peter Mignard (b. 1610, d. 1695) and Charles Le Brun (b. 1619, d. 1690) were pupils of the same school. The portraits of the former are good: the large pictures of Le Brun were disfigured by the affectation of the time of Louis XIV. Antoine Watteau was born in 1684, and died in 17[illegible]. Joseph Vernet (b. 1711, d. 1789) executed some beautiful landscapes and sea-pieces. J. B. Greuze (b. 1726, d. 1[illegible]) excelled in the representation of scenes of domestic In later times, Jacques Louis David (b. 1748, d. 1[illegible]) carried out on a larger scale the principles of Poussin. It is impossible to deny his pictures the merit of fine drawing and a certain power; but disagreeable colour, exaggerated theatrical expression, and academic affectation mar the effect of their better qualities. His most eminent followers were Gérard, Gros, Girodet, Guérin, and Géricault.

English School.—Except the portrait-painters, Dobson, Oliver, and Cooper, in the reign of Charles I., we cannot name an English artist of any eminence until we arrive at Hogarth (b. 1697, d. 1764); for his father-in-law Sir James Thornhill hardly deserves notice. The reader will find a more detailed account of Hogarth in the article which bears his name. No imitator has at all reached his peculiar excellence. Boydell's Shakspere Gallery certainly caused a feeling for art, and contributed to the spirit which prevailed in England at the end of the last century. Sir Joshua Reynolds (b. 1723, d. 1792) still remains the first on the list of English portrait-painters. His historical pictures are of very inferior merit. No portrait was perhaps ever painted which represents character more vividly, and tells its story better, than that of Lord Heathfield. Many of his female portraits are equally successful. His colour was excellent, though not always lasting. George Romney (b. 1734, d. 1802) has left some works which almost rival Reynolds. The earlier works of Benjamin West (b. 1738, d. 1820) make us *feel* more strongly the mannered uniformity and coldness of his later pictures. James Barry (b. 1741, d. 1806) had at least the merit of daring to undertake a work of the greatest magnitude. John Opie (b. 1761, d. 1807) was one of our most powerful masters, and certainly superior to Northcote. Wilson (b. 1714, d. 1782) and Gainsborough (b. 1727, d. 1788) must be looked on as the founders of the English school of landscape-painting. We cannot but lament that the Raphaelesque purity of Stothard's early designs was afterwards exchanged for the prettinesses of Watteau. It is impossible to deny poetical imagination and grandeur to Fuseli, though these qualities are obscured by overcharged and mannered drawing.

In our own day Lawrence executed portraits inferior only to those of Reynolds; but they possess rather more of the conventional tone of the fashion of the time in which the artist lived than is found in the best works of Sir Joshua Reynolds.

It remains to look round and see what is the promise of European art at the present time. In Italy and in Spain little has been *done* in this century. The influence of the school of David is visible in the works of Camuccini in the former country, and in those of Madrazo and Aparicio in the latter. Political events have doubtless contributed to bring about these results. In Germany a new era has commenced. We have passed too rapidly over the ground to notice Oeser (b. 1717, d. 1799), Raphael Mengs (b. 1728, d. 1779), Angelica Kauffman, and others; but at the present moment the schools of Düsseldorf and Munich are producing works whose celebrity will be lasting. Fresco-painting has started into life again with fresh vigour in the latter capital. In Overbeck, who resides at Rome, we find the purity and beauty of the Umbrian school renewed. Cornelius, Julius Schnorr, and Henry Hess, though far from faultless, have worked most successfully under the patronage of the king of Bavaria. At Düsseldorf, Lessing and Bendemann are two very distinguished artists, and painters of considerable eminence are not wanting at Berlin. Among modern French pictures the battle-pieces and historical works of Horace Vernet hold a high place. Leopold Robert is celebrated for his scenes of Italian rural life, Granet for his interiors, Gudin and Isabey for their sea-pieces. Delaroche and Eugène Devéria are traitors to the principles of David, and may be considered as the chiefs of a romantic school of French historical painting.

In England there is, as there ever has been, little demand for large historical works. Yet at the present moment no portrait painter of great excellence has filled the place of Lawrence. The earlier works of Wilkie are well known; to our eye there is in his later pictures a slightness and want of substance which is not compensated for by their facility of execution. Leslie and Mulready deservedly possess a high reputation in that walk of art which Wilkie seems inclined to abandon. Etty's colour and form are so fine that we regret the frequent absence of chaste feeling and the predominance of academical display. The characteristic excellence of Eastlake's pictures may be said to be their purity of taste and the evident marks which they bear of a highly cultivated mind, deeply imbued with the feeling of the older masters. The same refinement is visible in the exquisite landscapes of Calcott. No genius was ever more versatile than that shown by Turner. The gloomy grandeur of the Last Plague of Egypt, which is as simple as a landscape of Nicolas Poussin, contrasts singularly enough with the gorgeousness of the Rise of Carthage or the Italy. Without pretending to defend some of his extravagances of colour, it must be remembered that many pictures of Turner's, which now appear sober, were too gaudy for the public taste when they were painted, and only obtained gradually the rank which they hold at the present day.

As a painter of animals, Edwin Landseer far surpasses any of the old masters, and stands unrivalled for softness, breadth of touch, and wonderful expression of character. One remarkable feature in modern English art is the high class of works executed in water colours.

(Müller, *Handbuch der Kunst*; Smith, *Catalogue Raisonné*; Vasari, *Vite dei Pittori*; Lanzi, *Storia Pittorica*; Rumohr, *Italienische Forschungen*; Kugler, *Handbuch der Geschichte der Malerei*; Waagen, *Kunstwerke und Künstler in England und Paris*; Cean Bermudez, *Diccionario de las Bellas Artes*; Passavant, *Kunstreise durch England und Belgien*; Pilkington's *Dictionary of Painters*.)

PAINTING, HOUSE, is the art of painting the interior and exterior of our dwellings and other buildings with a composition which shall preserve from decay, please the eye, and render the surface to which it is applied less liable to soil and easier to be cleaned. It is executed either in oil or distemper.

In oil the principal tools employed are brushes made of hogs' bristles for large surfaces, and sash-tools made of finer hair for small work, as mouldings, window-bars, &c. After being used, they are kept in water to prevent their getting hard.

White lead is used for white colour; it is also the basis of all ordinary colours. The colouring substances (*stainers*) in general use are earths, umber, ochre, Sienna, Venetian red, purple, brown, &c.; the first three are sometimes burnt, a process which reddens and darkens them. Metallic compounds are red lead, vermilion, Prussian blue, chrome yellow, verdigris, Brunswick green, verditer, &c.

Animal and vegetable colours are lakes, indigo, ivory black, and lampblack.

All these require to be ground very fine in oil. This tedious and unwholesome process was formerly performed by hand, and by painters for their own use; but now the manufacturing chemists are enabled, by the application of machinery, to supply the articles cheaper than they can be prepared at home; and the painter, being relieved from this troublesome part of his business, will, if he aim at excellence in his profession, turn his attention to the higher branches of his art, and study the laws by which colours are related to each other, so as to be able to harmonise or contrast them as occasion may require.

The liquids in use are linseed oil (sometimes boiled with litharge to render it drying, and hence called *boiled oil*), and oil or spirits of turpentine, called *turps*. These are combined for use in various proportions according to circumstances: when the paint is required to bear a gloss, or is intended for outside work, most oil is used; and for black, chocolate colour, green, &c., outside, boiled oil alone, or with a very little turps, is best. For flatting, which has no gloss, turps alone is requisite. To all paint a little sugar of lead, or litharge (*dryers*), should be added to make it dry quick. It is important that all surfaces intended to be painted should be thoroughly dry, otherwise the paint will be liable to peel off.

With respect to mixing, the workman takes as much white lead as experience tells him is requisite, and a little oil or turps; and after these are mixed by stirring with a stiff knife, he adds dryers and a portion of one or more of the *stainers* above mentioned, according to the tint which he wishes to produce. After reducing the mass to the consistence of cream by the addition of turps or oil, the whole should be strained through a piece of canvas or muslin, when it is ready for use, and is termed by the workmen *colour*.

For the best work, the knots of yellow deal should be cut out to the depth of a quarter of an inch by the joiner, while the work is on the bench, and pieces of the same wood inserted in their places and glued in hand-tight only, for if compressed by a blow with a hammer, they will afterwards swell and spoil the surface. For general purposes the knots are painted with red lead and size. When this is dry, they are smoothed with glass-paper, and the work is ready for *priming*, which is composed of red and white lead ground in and mixed with linseed oil only. When dry, the work is again rubbed down with glass-paper or pumice-stone, and all nail holes, &c. are stopped with putty. The following coats contain about as much oil as turps, and are termed *second colour*, *third colour*, &c.; but the last coat previous to the finishing one is in all cases termed the *ground*, and is near the colour of the intended finish, except for black, green, and some other coarse dark colours, when the ground is lead-colour, composed of white and black mixed together.

The repainting of old work is the same as new, with the omission of the knotting and priming.

Stone-work, stucco, &c. are treated the same as wood. It is the general practice to repeat the coats, allowing sufficient time between each to dry, till the work ceases to absorb, which is known by the absence of dull spots and patches. It is also the practice to omit turps in mixing *colour* for work which is expected to absorb much. As to *graining*, the methods, tools, and materials adopted in this art vary with almost every workman, and it would be useless to attempt to describe in writing the processes which are so dependent on the artist's taste, but we may observe that the work having received a ground in oil of the predominating colour of the material to be imitated, the grain of wood is generally represented by semi-transparent colours mixed in beer. The subsequent varnishing fixes the colours, imparts a gloss, and defends the work from the weather.

Distemper.—The brushes for large surfaces differ from those used in oil: they are wider and flatter, and are termed distemper-brushes; but the tools for small work are similar. Whiting takes the same place in this branch that white lead holds in oil; the colouring substances are similar, but ground in water, and the fluids are water and melted size.

Mixing.—The whiting having been reduced to a stiff paste with water in which alum has been dissolved, the colouring matter is added, and the whole thinned with warm size. It must then stand till it gets cold, and it is not fit for use unless it *chills*, or forms a slight jelly. It is best to strain it after it has *chilled*, as the colouring substances will sometimes sink. Before applying this, the work must be well cleaned, for if there remains any substance which the fresh applied colour will soften and mix with, the work will not present a uniform appearance, but will be cloudy. The best work is painted first in oil, then flatted, and finished in distemper; but seldom more than one coat of distemper can be applied with advantage, for which reason care should be taken to cover every part equally, and particularly that the brush touch no part that is once dry; for this last reason several men are employed together, that the whole of any surface (as a ceiling) may be covered before any part has time to dry.

It is a generally received opinion among painters that white lead is the best material for painting work of all descriptions, with a view to its preservation, and they affirm that black paint is useless in that respect. Now, presuming that the durability of paint depends on the insolubility of the materials used in its composition, we might infer that black, which is composed of one of the most imperishable bodies known, namely carbon, in the state of lampblack, is more durable than white, which is made of carbonate of lead, a substance slightly soluble in water; and the following facts confirm this. To be able to judge fairly, we must have black and white of the same age equally exposed, and on the same material. These conditions are all fulfilled on finger-posts and other public notices exposed by the highways and on wooden grave-rails in country churchyards, which are almost invariably painted and written either black and white or white and black. Those with black grounds and white letters may often be seen with merely the illegible remains of the inscriptions while the ground is quite perfect. But the black writing frequently remains not merely till the white ground is washed away, but often till the surface of the wood, except where it is occupied by the letters, is decomposed to the depth of more than a sixteenth of an inch, actually leaving the inscription in relief; and although most general rules are said to have exceptions, the writer has never met with one to this.

PAINTING, ENAMEL. [ENAMEL.]

PAISIELLO, GIOVANNI, was born at Tarento in 1741, and entered at an early age in the Jesuits' College of that city, where he manifested so strong a disposition for music, that his father, an eminent veterinary surgeon in the service of Charles III., was prevailed on to place his son in the Conservatorio St. Onofrio at Naples, in which institution he was admitted in 1754, and during the following five years pursued his studies under the celebrated Durante. He there produced, among other compositions, a comic interlude, which at length became known in Italy, and in 1763 procured for him an order to compose an opera for the Teatro di Marsigli at Bologna. From that period the commencement of his professional career is to be dated, and it continued with undeviating success, till warned by approaching age, he wisely determined to relinquish his most active occupations, and enjoy in comparative ease his well-earned honours and moderate independence.

Paisiello's reputation was speedily established, and he soon accepted engagements to compose operas for every great city in Italy; in consequence of which he produced nearly fifty in the short space of thirteen years, the majority of which of course only enjoyed a short-lived triumph. In 1776 he entered into the service of Catherine II., and continued in Russia nine years, where he composed several operas, among which was his *Barbiere di Siviglia*; also an oratorio, *Il Passione*, and many sonatas, &c. He afterwards produced at Vienna, at the desire of Joseph II., *Il Re Teodoro*, and *La Molinara*; and for the same monarch wrote twelve symphonies.

On his return to Naples the king appointed him his *maestro di capella*, and settled on him a pension of 1200 ducats. The king of Prussia now wished him to visit Berlin, and the empress of Russia was desirous of his return to St. Petersburg, but he declined both engagements, as well as an invitation to London; but he composed for the King's Theatre *La Locanda*, which opera was subsequently performed at Naples under the title of *Il Fanatico in Berlina*. On the death of the French general Hoche, he produced a funeral symphony, for which he received a handsome present from Bonaparte; and about the same time brought out his *Zingari in Fiera*.

The revolution at Naples, in 1799, gave to that country a republican government, under which Paisiello accepted the office of 'National Director of Music;' but at the restoration of the royal family this was resented as an offence of magnitude, and he was suspended from all his public functions. In about two years however his services were found to be indispensable, and he was reinstated. Shortly after this he accepted an invitation from Bonaparte, then First Consul of France, to visit Paris, and was received in the most distinguished manner: a salary of 12,000 francs was assigned to him, and 18,000 more were added for his travelling and incidental expenses; besides which he was offered various high and profitable appointments, but declined them all except that of *maître de chapelle* to the head of the government. In Paris he produced thirteen masses, motets, &c., a *Te Deum* for Napoleon's coronation, and an opera, *Proserpine*, for the *Académie de Musique*. The air of France not agreeing with his wife's health, Paisiello returned in about two years and a half to Naples, but never failed to transmit to the French emperor a sacred composition for the anniversary of his birth.

A second revolution at Naples now placed Joseph Bonaparte on the throne of that kingdom, who confirmed Paisiello—who seems to have been very accommodating in his politics—in all his appointments, with a liberal augmentation of his salary; and the French emperor made him a chevalier of the legion of honour, with a stipend of 1000 francs. Other honours were showered on the composer, some of them not mere distinctions; and, to crown the whole, he was elected an associate of the French Institute. He died at Naples, in 1816. The city rendered him funeral honours, and his *Nina* was given at the great theatre on the evening of his interment, the king and the whole court attending the performance.

'Paisiello,' says the Chevalier Le Sueur, 'was not only a great musician; he possessed a large fund of information, was well versed in the dead languages, and conversant in all the branches of literature. . . . . Endowed with a noble mind, he was above all mean passions; he knew neither envy nor the feeling of rivalry.' To which we may add, that his compositions afford the most indisputable proofs of an accomplished and elegant mind. If they do not exhibit the energy of the more modern school—that is, of the school of Germany—they are never deficient in pathos, they abound in tenderness, and are invariably characterised by truth of expression—by the admirable judgment with which the sentiments of the poet are illustrated; and as a melodist, he is yet without a superior—witness, among a multitude of instances that might be cited, his 'Nel cor più non mi sento,' and 'Io son Lindoro' &c., 'Hope told a flattering Tale,' and 'For Tenderness form'd'), which are known, and will for ever be known, in every corner of the world where European music is cultivated. And though his operas, *Elfrida*, *Pirro*, *Il Barbiere di Siviglia*, *La Molinara*, *Nina*, &c. are eclipsed by the grander and certainly more complete instrumentation of that school of which Mozart is the model, yet, with additional accompaniments and skilful management, they might now be brought out successfully, and thus resuscitated, would be admitted to have lost none of those charms which beautiful air must always possess, and by which the last age was captivated.

PAISLEY, a town of Scotland, in the county of Renfrew, is situated on both banks of the White Cart, about three miles above the junction of that river with the Clyde, in 55° 48′ N. lat. and 4° 26′ W. long., and is 48 miles west by south from Edinburgh, direct distance. In the time of Agricola the Romans had a station here, and the present Bowling-green is traditionally said to have been the prætorium of the Roman fort. (Chalmers's *Caledonia*, i., pp. 91, 128.) About the year 1160 a priory was founded on the eastern bank of the Cart, by Walter, high-steward of Scotland. The name originally given to this establishment appears to have been *Passeleth*: thus at least is the spelling which occurs in a charter of David I., and from which the present name of Paisley is doubtless derived. Chalmers supposes Passeleth to be derived from the British *Pasgel-laith* (signifying moist pasture-land); but a different etymology is given by a contributor to the 'New Statistical Account of Scotland,' who is of opinion that it comes from the Saxon *Legh* or *Leg* (valley) and *Pais* (peace) or Pass (pass). It was munificently endowed by the descendants of the founder with lands and other property. In 1219 Pope Honorius issued a bull raising the priory to an abbacy, and thereby rendering it independent of the bishop of the diocese. In the reign of Robert III. the abbot and monks were incorporated by royal charter, and thenceforward held their possessions under the crown in free regality, until the suppression of the monasteries in 1535-36, when all the revenue and privileges were resigned in favour of Lord Claud Hamilton, third son of James duke of Chatelherault, the then governor of Scotland, from whose descendants they passed to Lord Cochrane of Paisley and Dundonald. With the growth of the monastery there arose a small town on the opposite bank of the Cart, which James IV., in 1488, erected into a free burgh of barony, under the superiority of George Schaw, the abbot of Paisley. In 1658 the family of Dundonald resigned their right of superiority in favour of the Protector, which act of alienation was confirmed by a charter of Charles II. granted in 1665; but shortly after (1692) that family again acquired the 'lordship of erection' from the crown, which in 1726, by contract of sale, they resigned in favour of the magistrates and council of the burgh. It appears however that the Dundonald family, though no longer possessing any superiority over the burgh of Paisley, were sole proprietors of the lands in the vicinity of the Abbey till the year 1764, when they were bought by the marquis of Abercorn. It is upon these lands that the new town of Paisley has, since 1779, been erected.

The town of Paisley, in the early part of the last century, was solely on the west bank of the river, and it then consisted merely of one principal street and a few straggling lanes. It is now the third town of Scotland in population and commercial importance. The houses are far less handsome than those either of Edinburgh or Glasgow. Low thatched roofs are not uncommon even in some of the principal streets, particularly in the old town, but they are diminishing in number every year. Most of the streets and shops are lighted with gas. The water is indifferent in quality, and the supply has been, at least till very recently, very inadequate. Most of the inhabitants are obliged to purchase water which is filtered from the Clyde or drawn from springs in the neighbourhood. An unsuccessful attempt was made in 1825 to establish a water company. Since that time a capital of 40,000*l.* has been subscribed, and an act of parliament obtained for intercepting the drainage of about 1600 acres on the north-western side of the Gleniffer Braes, and two reservoirs, calculated to contain 50,000,000 cubic feet of water, were, in 1837, in the course of formation, and the entire work was expected to be completed in two years. In the years 1835 and 1836 there fell at Paisley 35 inches and 44·2 inches of rain respectively.

The nave of the old abbey church is all that remains of the antient monastery. It was carefully repaired in the latter part of the last century, and is now used as a parish-church. The style is chiefly Gothic. No part is supposed to be earlier than the middle of the fourteenth century, as in the year 1307, during the wars of the Succession, the monastery is stated to have been almost wholly destroyed by the English. The abbey of Paisley was the family burial-place of the Stewarts, before their accession to the Scottish throne, and since then Robert III. and Euphemia, the wife of Robert II., were interred here. The registry or chartulary of the abbey was published by the Glasgow Maitland Club in 1832. The other churches of the establishment are, the High Church (built in 1756), the Middle Church (1781), and St. George's (1819), the ministers of which receive 300*l.* per annum each. Besides these, there are the Gaelic chapel and a great many other places of worship. Paisley is a presbytery within the synod of Glasgow and Ayr. The burgh and new town are united by three stone bridges, each of two arches. Between two of these, the old and Sneddon bridges, and on the western bank, is situated the castle or county-hall, a fine stone-building erected in 1818, and comprising a court-house, council-chamber, and other offices, a debtor's prison, another for criminals, together with a bridewell and chapel. The police of the town and suburbs is regulated by an act passed in 1806.

Under the act 3 & 4 Will. IV., cap. 77, the magistracy consists of sixteen councillors, including a provost, four bailies, and a treasurer, one-third of whom retire from office annually. The antient boundaries of the burgh are far more restricted than the present parliamentary and municipal boundaries, which include about six square miles, and comprise a large agricultural district. The property of the corporation, in 1833, was estimated at 59,125*l.* The income during the same year was 3843*l.*, and the expenditure 3778*l.* The debts of the corporation, which in 1802 amounted to 15,000*l.*, had increased in 1833 to 33,000*l.* This increase is attributed to the outlay attending the many public works undertaken during the intervening period. Among the earlier works undertaken by the corporation is the improvement of the navigation of the Cart, under a local act passed in the year 1787, authorising the council to levy tonnage dues for that purpose. The bed of the river was considerably deepened, except near Inchinnan Bridge, where it was deemed advisable to connect the parts of the river above and below that bridge by means of a canal which crosses the turnpike road leading from Greenock to Glasgow, and which was completed in 1791. The Cart is now navigable up to the town for vessels of from 50 to 60 tons burthen. The Glasgow, Paisley, and Ardrossan Canal, the cost of which already amounts to 130,000*l.*, but which as yet does not extend in a westerly direction beyond the populous village of Johnstone, crosses the Cart water by an aqueduct bridge on the southern side of the town. A railway extends from the town to a station on the left bank of the Clyde, a little above the mouth of the Cart; and an act of parliament has lately been obtained for constructing a branch of the Forth and Clyde Canal to terminate nearly opposite to this station.

In 1707 the principal articles made in the town were coarse linen, chequered cloths, and Bengals, to which succeeded chequered linen handkerchiefs, and goods of a lighter texture, such as lawns. About 1725 the machinery for making white sewing or ounce thread was introduced from Holland. About 1760 the manufacture of silk gauze was introduced upon the plan practised by the Spitalfields houses, and, during the greater part of the following thirty years, was carried on upon a very extensive scale. The competition between the London and Paisley houses obliged many of the former to relinquish altogether the manufacture of this article. Others removed their establishments to Scotland. The reduction in the cost of cotton goods, consequent upon the invention of Arkwright's spinning-machinery, lessened the demand for silken fabrics, the manufacture of which at Paisley has since then greatly declined.

In 1784, when the linen trade was more prosperous than it has ever been, either before or since, the value of the manufactures produced at Paisley, consisting of silk and linen gauze, lawns, and white sewing thread, was estimated at 579,185*l.*; their value in 1720 was 660,385*l.* Since 1825 a great number of hands have been employed in the manufacture of crape dresses, and damask and embroidered shawls, in imitation of those imported from China. The gross amount of the shawls sold in 1834 was estimated at one million sterling, which was less than in some of the preceding years. Many of the principal establishments of the town are now exclusively engaged in the various branches of the cotton manufacture, among which the muslin branch may be particularly mentioned as that of which Paisley is regarded as the chief seat. A considerable portion of the yarn used in making the finer qualities of muslins is imported from Lancashire. The number of looms in the town in 1837 was ascertained to be about 6000, of which 300 were worked by Glasgow houses. Besides these, about 2000 looms were employed in the country by Paisley capital. The total number of weavers at the same time was 6040. There are also a large iron and three brass founderies, one tan-work, three breweries, three distilleries, one large soap-work, seven extensive bleach-fields, one large silk-throwing mill, &c.

Since the passing of the Scotch Reform Act in 1832, Paisley has returned one member to the British parliament. The boundaries of the parliamentary borough comprise four parishes, whose aggregate population, in 1831, was 57,466, and was distributed among 12,308 families, of whom nineteen-twentieths were employed in trade and manufactures. These parishes were, Paisley Abbey (population 26,006), High Church (14,621), Low Church (6955), Middle Church (9884), which, with five others, constitute what, prior to 1736, was called the parish of Paisley. The new town and suburbs of Paisley and Johnstone, which contain respectively 14,739 and 5617 inhabitants, are included in the return of Paisley Abbey parish. The other three parishes, and these only, are within the corporate liberties. A considerable portion of the inhabitants are Irish, whose immigration materially contributed to the increase of the population during the ten years preceding 1831. This increase amounted to 5032 persons in the three corporate parishes, and 5431 persons in the new town. The local taxes levied within the corporate liberties amount, upon an average of ten years, to 3239*l.* per annum, of which the sum of 2096*l.* is raised on account of the poor. From these taxes the inhabitants of the new town are entirely exempted, as well as from certain charges paid by those who carry on business 'within the burgh.' Although Renfrew is the county town, Paisley has long been the seat of the sheriff's or county court. In 1815 an additional sheriff's court was established at Greenock, and since then the county has been divided into two districts, called the upper and lower wards, the former of which is annexed to the court of Paisley.

There is a weekly market on Thursday, and four fairs, each of three days' duration, which are held in February, May, August, and November. The market and two of the fairs were originally established by charter of Charles II., granted in 1665.

In 1834 there were three parochial and fourteen non-parochial schools in the parish of Middle Church. The greatest number of children which attended the fourteen non-parochial schools during the half year ending with Lady-day, 1834, was 517 boys and 396 girls; the least number during the same period was 425 boys and 338 girls. In High Church parish, where there were no parochial schools, but the same number (fourteen) of non-parochial, the greatest number of children was 888 boys and 751 girls, and the least number 685 boys and 493 girls. One of these was a charity school, wherein 150 day and 100 evening pupils were taught gratuitously. In Low Church parish there was a burgh school. The other schools in this parish, six in number, none of which were parochial, were attended by 555 children, including evening classes. In Paisley Abbey parish there were thirty-one schools, entirely non-parochial. The greatest number of attendances in the half year was 1268 boys, 782 girls; the least number is not stated. In a district of the parish of High Church, containing a population of 1047 persons, there were 46 children between the ages of 5 and 10 who could not read and were not at school; 96 between the ages of 10 and 15 who could not write; 18 above the age of 15 who could neither read nor write: and there were 96 children at school. The above returns do not include Sunday-schools, which were attended by more than 1500 children. The number in 1836 was 4198. (*New. Stat. Acc.*) It was remarked by the Commissioners, from whose Report these numbers are taken, that of the families employed in factories, a greater proportion of the children were attending school than of the families of weavers and labourers. Since the date of the Commissioners' Report, an infant-school has been opened, an endowed school has been established, and a government grant of 700*l.*, augmented by the subscriptions of the inhabitants, has afforded the means of erecting three new school-rooms and enlarging an old one. About three years since, an association was formed for the purpose of instituting a school for the middle and higher classes, to be called the 'Paisley Academy.' There are within the town 45 friendly societies, numbering from 120 to 500 members each, and two of which are supported and conducted exclusively by females. These societies upon the whole are stated to have succeeded remarkably well. The 'Paisley Provident Bank' was established in 1815. Its receipts for the year ending October 30, 1836, amounted to 4520*l.* There is a public dispensary, an infirmary, a mechanics' institution, several subscription libraries, &c.

(*Reports on Scotch Municipalities*, 1836; *Abstract of Report on the state of Education in Scotland*, 1837, xlvii., p. 628-31, and other *Parliamentary Papers*; Chalmers's *Caledonia*; Camden's *Britannia*; Pennant's *Tour in Scotland*; Wilson's *Agricultural Survey of Renfrewshire*, 1812; Crawford's *Renfrewshire*, edited by Robertson, 4to., Paisley, 1818; *New Statistical Account of Scotland*; &c.)

PAL-AIR. [HINDUSTAN, vol. xii., p. 208.]

PALACE, a word adopted into all European languages from the Latin *Palatium*, the name given by Augustus to his residence on the Mons Palatinus at Rome. In its stricter meaning it is restricted to a royal abode, but is occasionally applied to any sumptuous habitation. In Italy the term Palazzo, taken by itself, is used for any large mansion or nobleman's house; and palaces of this class constitute, after churches, the principal architectural features of Genoa, Florence, Rome, Milan, Vicenza, Venice, and other cities, to which they impart an air of grandeur which is wanting in the street architecture of this country; for in spite of all other defects and the bad taste they frequently display, they generally possess the redeeming quality of dignity. Our own metropolis, on the contrary, possesses scarcely half a dozen private mansions that have any pretensions to external nobleness of style. In fact the most palazzo-like buildings we have are one or two of our modern club-houses, more especially the new Reform Club-house, which eclipses all the previously erected ones. Neither are any of our royal palaces, with the single exception of Windsor, stamped by architectural magnificence; both in extent and style they are surpassed by several of the country-seats of our nobility. St. James's Palace is remarkable only for its size and its uncouth appearance. Considered as a work of architecture Buckingham Palace is absolutely discreditable to the present age, its sole characteristics being excessive littleness of manner, and feebleness and triviality of style; whereas, if not remarkable for beauty, Jones's intended palace at Whitehall would at all events have been a pile of imposing dignity. Kensington Palace is merely a respectable mass of brick buildings, and Wren's edifice at Hampton Court is no more than a lumpish piece of formality, destitute of dignity and elegance.

In fact, there are throughout the whole of Europe very few royal palaces, whatever may be their magnitude, at all distinguished by superior architectural taste. In the French capital, it is only the eastern façade of the Louvre, the river front, and the inner court which can lay claim to beauty or richness, the Tuileries being only a mass of quaint grotesqueness. The Vatican at Rome is merely a huge irregular pile, and Versailles and the Escurial, notwithstanding the millions they cost, both monuments of exceedingly bad taste. Though far from beautiful, the royal palace at Madrid, begun in 1737, from the designs of Giambattista Sachetti, an Italian architect, is a stately and regular pile, it being 470 feet square, and 100 in height, but the effect such a mass would otherwise produce is greatly impaired by the number of mezzanines. The same remark applies to the celebrated palace erected by the king of Naples, about the middle of the last century, at Caserta, and of which Vanvitelli was the architect. This building is certainly characterised by magnitude, for it extends 731 feet from east to west, and 569 from north to south; yet in either grandeur of conception or majesty of style there is very little, certainly not enough to reconcile us to the principal execution of so very indifferent a design. The royal palace at Stockholm is a stately edifice in the Italian style, although the original design, by Count Tessin, was considerably curtailed. The original imperial winter-palace at St. Petersburg was a vast pile erected by the Italian architect Rastrelli in the reign of the empress Elizabeth, of most imposing aspect towards the quay of the Neva, but exceedingly heavy and grotesque as to style. This structure, or at least the chief portion, was destroyed by fire in the beginning of 1838, but has since been rebuilt, though we do not know whether according to an entirely fresh design. The Neue Residenz and Königsbau at Munich have already been spoken of elsewhere. [MUNICH.]

Enormous as have been the sums expended upon many of these edifices, every one of them falls very short of the ideal of a royal palace, in which, if anywhere, not only all the luxury and pomp of architecture, but a certain colossal dignity of aspect should present itself. This can never be accomplished where stories above stories are allowed to display themselves externally. That is but a vulgar species of architectural grandeur which is produced by a numerical multiplication of little parts and features. All the rooms required for the accommodation of an extensive household should be turned towards inner courts, and the whole exterior, having only a single range of lofty windows above the ground floor, should be left for the unrestrained display of architecture, and sculpture upon a noble scale, without any intermixture of littleness. By such a disposition, too, convenience would perhaps be found far better consulted than at present, because, while all the apartments for official and state receptions and court entertainments would be connected together, the whole of the vast number of subordinate rooms required in such a habitation would be concentrated within the general plan, and at the same time might be kept entirely apart, by means of galleries between the outer and inner range, communicating at intervals with lesser vestibules and staircases attached to the suites of lesser rooms and private apartments of every description.

PALÆ'ADES. [TRILOBITES.]

PALÆMON, the generic name for the *Prawns*. [SHRIMPS.]

PALÆMONIANS, or PALÆMO'NIDÆ, Prawn tribe. [SHRIMPS.]

PALÆOGRAPHY. The study of ancient documents, called by modern antiquaries 'Palæography,' is too extensive a subject to be canvassed at length in a work like the present. We content ourselves therefore with pointing out to the student the most eligible works on the subject, and with setting before him as briefly as possible the indices which have been published to the manuscript stores of this and other countries.

An 'Introduction to Bibliography,' by Mr. Hartwell Horne, contains some elementary matter very well adapted for the beginner; it is however principally compiled from some French works on the subject. The splendid volumes recently published by the French historical commission, under the title of 'Elements of Palæography,' may be safely stated to contain every particular that can be wished for; and this work is so luminous in its details, that we need do no more than refer to it for the usual abbreviations employed in the middle ages in every kind of political and ecclesiastical documents. Walther's 'Lexicon Diplomaticum' may also be referred to as a useful work. At the same time we must beg to caution the reader against a book, published some years since, entitled 'A Guide to Court Hand,' by Mr. Wright, which is as full of errors as a book can well be. A certain series of abbreviations are found in all Latin manuscripts, and these have been imitated in type in the works of the late Record Commission. Mr. Black has given a complete list of these abbreviations, with explanations, in the 'Excerpta Historica.'

A great quantity of abbreviations are merely arbitrary, which requires practice and ingenuity before all kinds can be read with any facility; for instance, the capital letter A has been found to represent the following words:—Ab, Abbas, Abs, Actiacus, Actio, Actus, Ad, Ædilis, Ædilitius, Æs, Æternum, Æs, Ager, Agis, Agrippa, Agrippina, Ait, Ala, Albus, Alius, Alter, Amantissimus, Amicus, Amnem, Annus, Annos, Animus, Annus, Ante, Antiochia, Antonius, Apollo, Apponere, Apud, Aqua, Aratrum, Arbitrium, Arbitrium, Argentum, Aristides, Artificialis, Assis, Assignatum, Asses, At, Auctor, Auctoritas, Augusta, Augustalis, Augustus, Aulus, Aurelius, Aurum, Auspicium, Aut, Auxilium, Avis, Avus. The edition of Gaius by Goeschen, Berlin, 1824, contains a complete alphabetical list of all the sigla or abbreviations which are used in the Verona MS. They are very numerous; and as one abbreviation often represents a great many different words, it is only from the context that the meaning in any given instance can be ascertained. [GAIUS.]

We now proceed to present the reader with the principal desiderata in this branch of literature, a list of catalogues of manuscripts in the libraries of this country and the Continent.

The British Museum.—In point of real interest and value, the collection of manuscripts preserved in this noble establishment surpasses every other.

1. 'A Catalogue of the Cottonian MSS. in the British Museum,' fol., Lond., 1802.

This collection forms the most valuable portion of the Museum's stores; but it is so well known, that any further notice of it here is unnecessary.

2. 'A Catalogue of the Harleian MSS. in the British Museum,' 4 vols. fol., 1808-12.

Mr. Halliwell says that 'the first portion of this catalogue is very well compiled, but the third volume is full of imperfections and errors:' the fourth volume contains an excellent index by Mr. Horne. This collection includes numerous MSS. of every class.

3. 'A Catalogue of the additional Manuscripts in the British Museum,' by S. Ayscough, 2 vols. 4to., Lond., 1782.

A new catalogue of these MSS. is in preparation.

4. 'A Catalogue of the Lansdowne MSS. in the British Museum,' fol., London, 1819.

The most remarkable and valuable portion of this collection is the Burghley Papers, which fill 121 folio volumes, and comprise a multitude of state documents, together with the political and miscellaneous correspondence of Lord Burghley, extending throughout the long reign of Queen Elizabeth. The collection also contains the papers of Dr. White Kennett, bishop of Peterborough; and a large portion of those of Sir Julius Cæsar, judge of the Admiralty in Queen Elizabeth's time. Bishop Kennett's papers relate to the ecclesiastical history of England and to the biography of the more eminent of the clergy, with materials for a detailed history of the diocese of Peterborough or of places therein. The papers of Sir Julius Cæsar furnish most ample information respecting the finances of the reigns in which he was officially employed, and contain many curious articles on the privileges and practice of the courts of Admiralty, Requests, Star Chamber, and Exchequer. Exclusive of these larger series, the Lansdowne manuscripts have many volumes of great interest; among them a volume of letters by royal, noble, and eminent persons in Great Britain, from the reign of Henry VI. to that of George III.; two volumes of letters written by foreign sovereign princes and other distinguished strangers during the sixteenth, seventeenth, and eighteenth centuries; three volumes of letters to Henry Cromwell, when chief governor of Ireland; eleven volumes of the papers of Dr. John Pell, envoy from Oliver Cromwell to the Protestant cantons of Switzerland; five volumes of Sir Paul Rycaut's papers; and three volumes containing the correspondence of the Earl of Melfort during his negotiations at Rome in the year 1690. Neither would it be right to pass over without notice numerous monastic chartularies and registers; among them, registers of the priory of St. John of Jerusalem, of Harewood Priory, of Lundæ Priory, of the monastery of Gerondon, of Malmesbury Abbey, and of the Abbey of Melsa; two registers of Chertsey Abbey, and one of the prebendal church of Edyndon in Wiltshire.

5. 'A Catalogue of the MSS. of Francis Hargrave, now deposited in the British Museum,' 4to, London, 1818.

These MSS. relate almost exclusively to law; they consist of year books, reports, readings on various statutes, treatises on the authority and jurisdiction of the several courts of law and equity, collections of cases and opinions, collections respecting the customs and privileges of London and other places, and tracts and dissertations on numerous points and matters of law, with a few historical, political, and miscellaneous papers and letters.

6. 'A Catalogue of the MSS. in the Royal Library in the British Museum,' 4to., London, 1734.

This contains the MSS. of the old Royal Library at St.

James's, and possesses curious articles in almost every branch of literature.

7. 'Catalogus Codicum Manuscriptorum Bibliothecæ Burneianæ,' fol., London, 1839.

It contains about 520 volumes of manuscripts; among which are five manuscripts of the gospels in the original Greek, of the eleventh, thirteenth, and fourteenth centuries; copies of commentaries upon the scriptures, both in Greek and Latin; and manuscripts of the didactic and controversial works of several of the Greek and Latin fathers. But the most important portion of the collection consists of manuscripts of the classical authors. Of these, the celebrated manuscript of the 'Iliad' of Homer, formerly belonging to Mr. Charles Townley, is justly entitled to the first place in estimation. Though probably not older than the latter part of the thirteenth century, it is one of the earliest complete manuscripts of the 'Iliad,' and is particularly valuable, both on account of the correctness of its text and also of the copious scholia with which it is illustrated. Two copies of the Greek orators likewise deserve especial notice; one of them, written upon vellum, is perhaps the most important manuscript extant of these authors; it yields many valuable readings, and supplies, besides smaller lacunæ, portions of Isæus, Lycurgus, and Dinarchus. There is also an important manuscript of the Geography of Ptolemy, with maps, in the original Greek; a volume containing the twenty comedies of Plautus, a portion of which has been collated by Mr. Hildyard for his editions of the 'Menaechmi' and 'Aulularia;' a beautiful manuscript of Callimachus; and a very fine copy of the mathematical collections of Pappus Alexandrinus, which formerly belonged to Baroci. [PAPPUS.]

8. 'A Catalogue of the Arundel Manuscripts in the British Museum,' fol., London, 1834.

This collection is rich in materials for the history of our own country and language, having no less than seven copies of the 'Historia Britonum' of Geoffry of Monmouth, copies of the histories or annals of Henry of Huntingdon, Ralph Higden, Roger de Hoveden, William of Malmesbury, Nicolas Trivet, and others. It has also a recent but unique manuscript of Ingulph's 'Descriptio Abbatiæ Croylandensis,' and a volume of letters and other documents relative to the divorce of Henry VIII. from Katherine of Aragon, some of which are original. There are also chartularies of the Abbey of St. Alban's, of the hospital without the Southgate at Bury St. Edmunds, of the monastery of St. John at Colchester, of the abbeys of Sibton and Tinterne, of the monasteries of St. Austin and Christ-Church, Canterbury; of the convent of St. Mary and St. Margaret, Dartford; of the abbey of Glastonbury, and of that of Newenham in Devonshire. We may also mention a curious volume entitled 'Ayenbyte of Inwyt,' composed A.D. 1340, by a monk of Canterbury, in the Kentish dialect of that period, and which will shortly be published by Mr. Wright; and a large number of volumes on jurisprudence, comprising the 'Digests and Codex of Justinian, the 'Decretum' of Gratian, and the 'Decretals' of Gregory XII. and Boniface VIII., with numerous glosses, commentaries, dissertations upon texts, summaries, and collections of decisions, cases, and opinions.

9. 'Catalogue of the additional MSS. in the British Museum,' 24 vols. fol.

These are deposited for general use in the reading-room of the Museum.

Other Libraries in Great Britain.—We possess the following printed catalogues:—

1. 'Catalogi Librorum Manuscriptorum Angliæ et Hiberniæ, in unum collecti, cum indice alphabetico,' fol., Oxon, 1697.

The first volume contains a catalogue of the Bodleian and Ashmolean manuscripts; the second, those of the colleges of Oxford and Cambridge; the third, of various libraries in England; and the fourth, of Irish libraries. 'A Short Account of some MSS. in the English Libraries which contain parts of the Corpus Juris by Dr. Hach, Jun.,' was printed in the 'Zeitschrift fur Geschichtliche Rechtswissenschaft,' vol. v., 1821.

2. 'Catalogus Librorum Manuscriptorum Col. Corp. Christi. Cantab.,' 4to, Cantab, 1777.

3. 'Catalogus Codicum Manuscriptorum Eccles. Cathed. Dunelmensis,' fol, Dun., 1824.

4. 'A Catalogue of the Manuscripts in the Library of the Society of Antiquaries,' by Sir H. Ellis, 4to., London, 1816.

5. 'A Catalogue of the miscellaneous Manuscripts in the Library of the Royal Society,' by J. O. Halliwell, Esq., 8vo., London, 1840.

6. 'A Catalogue of the Archiepiscopal MSS. preserved in the Library of Lambeth Palace,' by Todd, fol., Lond., 1812.

7. 'Catalogus sive Notitia Manuscriptorum, qui à G. D. Clarke, comparati in Bibliotheca Bodleiana adservantur,' 4to., Oxon, 1812.

Principally classical.

8. 'Catalogus Codicum MSS. et Impressorum cum notis Manuscriptis, olim D'Orvilliani,' 4to., Oxon, 1806.

This collection is in the Bodleian Library.

9. 'A minute Catalogue of each particular Manuscript contained in Wood's Collection at Oxford,' 8vo., Oxf., 1761.

We must here notice the splendid library of Sir Thomas Phillips, Bart., at Middle Hill, Worcestershire, who possesses the largest known private collection of manuscripts and charters, some of which are of the greatest rarity and importance. A slight catalogue of a portion of these has been privately printed by the learned possessor at his own private press, and this has been copied into Haenel's compilation. The Earl of Leicester at Holkham possesses a valuable collection, of which a brief account has appeared in the second volume of the 'Transactions of the Royal Society of Literature.' Dr. O'Conor prepared a catalogue of the MSS. at Stowe, the seat of the Duke of Buckingham, which was privately printed in 1818, in two volumes 4to. Considerable numbers of MSS. are likewise preserved in the Glasgow University library, Lincoln Cathedral, and in various places, by far too numerous for us to attempt even a bare outline; we give however a slight list of the documents preserved in the Tower of London, with the hope that it will prove useful to the antiquary and historian:—

1. Negociationes et fœdera cum principibus extraneis.
2. Gentis hujus atque populi præclaræ res gestæ in Gallia aliisque regionibus transmarinis.
3. Homagium et servitia, in quibus Scotia ab Anglia pendet.
4. Hiberniæ in legibus et dominiis constitutio.
5. Dominium marium Britannicorum, Gallos Batavosque a Piscatione in prædictis maribus prohibens, nisi venia prius a Regibus Angliæ impetrata, generali præscriptione comprobatum.
6. De rebus Walliæ, ac etiam compotis reditium Principis Walliæ.
7. Quæ res potissimum ad commoda spectarunt Insulæ Monaviæ, Insularum Cæsariæ et Sarniæ, Vasconiæ, Caleti, Burdegalæ, aliarumque Galliæ partium, quamdiu sub Anglorum ditione tenerentur.
8. Jus linealis successionis, quo reges Angliæ regnum Galliarum vendicant.
9. Tenuræ terrarum in Anglia extentæ, sive metationes maneriorum, et inquisitiones post mortem, ostendentes quas terras defunctus tenuit, quis proximus hæres, et quot annos habuit.
10. Libertates atque privilegia concessa urbibus oppidisque corporatis, vel personis privatis, uti letæ, mercata, feriæ, communia pasturæ, waivia, extrahuræ, felonum bona, pontagium, &c., et quicquid aliud ad fiscum regium perventurum est, vel ex eo proventurum.
11. Coronationes regum Angliæ, cum particularibus tenuris et clameis singulorum qui dictis coronationibus inservire tenentur, una cum ordine et ratione processionis.
12. Brevia, placita, processus spectantes ad supremam Cancellariæ curiam, ad curias Banci Regii, Communium Placitorum, Scaccarii, et justitiariorum itinerantium.
13. Concessiones regiæ custodiæ comitatuum, urbium, oppidorum, et portuum. Conscriptiones et delectus copiarum tam marinarum quam terrestrium in regni propugnationem.
14. Fundationes abbatiarum et prioratuum, aliarumque ædium religiosarum in Anglia, Wallia, Gallia, et Hibernia, una cum singularum ordinibus, terrisque et possessionibus iisdem donatis.
15. Metæ et termini forestarum in Anglia cum clameis forestariorum.
16. Inspeximus et irrotulationes chartarum et munimentorum, tam ante quam post Conquestum concessorum.
17. Irrotulantes multarum evidentiarum et contractuum inter personas invicem datorum.
18. Concessiones et constitutiones plurimorum superioris ordinis officiorum in regnis Angliæ et Hiberniæ.

19. Officium Marescalli Angliæ.
20. Placita et creationes procerum.
21. Paparum bullæ autographæ.
22. Bullæ taxationis Papalis, continentes valorem singulorum beneficiorum in Anglia.
23. Regalia regum Angliæ in rebus ecclesiasticis accurate descripta.
24. Quamplurima records præcipue spectantia ad rem pecuniariam, nummariam, feodalem, classicam, ad militiam, ad bellum, et regni defensionem per multa sæcula.
25. Auxilia et subsidia Regi concessa.
26. Chartæ et confirmationes libertatum et privilegiorum collegiorum et civitatis Oxoniensium.
27. Præsentationes factæ a Domino Rege ad ecclesias, præbendas, et capellas.
28. Tabula rotulorum parliamenti hodie extantium in officio custodis recordorum in turri Londinensi, ab an. 5 Edw. III. ad an. 22 Edw. IV.

The most complete index to the literary stores of the Continent is in Hænel's 'Catalogus Librorum Manuscriptorum qui in Bibliothecis Galliæ, Helvetiæ, Belgii, Britanniæ Magnæ, Hispaniæ, Lusitaniæ asservantur,' published at Leipzig in 1830. To that work we refer the reader, merely observing that the portion containing an account of the manuscripts of this country is very imperfectly and badly executed.

The Age of Manuscripts.—There are several criteria whereby we are enabled to judge of the age of manuscripts, but it requires much practice before a really correct opinion in these particulars can be given; and so much depends upon a personal examination of a large number of all ages, that no infallible rules can be given on the subject. We refer the student to Wailly's 'Paléographie.'

The books principally made use of in the preceding slight sketch are—1, *The Appendix to the Last Report of the Record Commissioners*; 2, Halliwell's *Hints to Novices in Manuscript Literature*; 3, *Élémens de Paléographie*, 2 vols.; 4, Casley's *Catalogue of Manuscripts in the King's Library*. But the most accessible work on this subject is *A Treatise on Bibliography*, by the Rev. Thomas Hartwell Horne, the author of the valuable 'Index' to the *Harleian Catalogue*, which contains much useful information for the general reader.

PALÆ'OMYS, Professor Kaup's name for an extinct genus of Rodents from the Epplesheim sand.

Example, *Palæomys castoroides* (Kaup).

PALÆONISCUS, a remarkable genus of Heterocercal fossil fishes, constituted by M. Agassiz, and included by him in the first family (Lepidoidei) of his great order of Ganoidean fishes. Its place in this family will appear from the following synopsis of the Lepidoidei:—

A. Body elongated, fusiform, upper lobe of the tail vertebrated, and longer than the lower lobe.
- *Acanthodes.*
- *Catopterus.*
- *Amblypterus.*
- *Palæoniscus.*
- *Cheirolepis.*

B. Body flat, broad.
1. Upper lobe of the tail vertebrated.
   - *Platysomus.*
   - *Gyrolepis.*
2. Tail regular (the lobes nearly equal).
   - *Tetragonolepis.*
   - *Dapedius.*

C. Body elongated, fusiform, tail forked or rounded.
- *Semionotus, Lepidotus, Pholidophorus, Microps, Notagogus.*

The generic character of Palæoniscus is thus given:—

All the fins of moderate size, with small rays on their edges; the dorsal fin opposite the interval of the ventral and anal fins. Scales moderate. In some species the scales are larger, and the body is broader and shorter than in the others; there are always large mesial scales in front of the dorsal and anal fins.

The genus comprehends Palæoniscum and Palæothrissum of Blainville.

The geological interest of this genus is considerable, inasmuch as the numerous species appear to be very definitely distributed in the strata of the Carboniferous and Saliferous systems of Europe and America. The following is the list of species examined by Agassiz, with their localities, and the names of the formations in which they occur:—

1. P. fultus . .	Coal formation	Sunderland (Massachusetts), Westfield (Connecticut).
2. P. Duvernoy .	Coal formation	Munster Appel.
3. P. minutus .	Coal formation	Munster Appel.
4. P. Blainvillii .	Coal formation	Near Autun.
5. P. Voltzii .	Coal formation	Near Autun.
6. P. angustus .	Coal formation	Munster Appel.
7. P. Vratislavensis	Rotheliegende	Ruppersdorf in Bohemia.
8. P. lepidurus .	Rothelliegende	Scharfeneck in Co. Glatz.
9. P. Freieslebeni	Zechstein . .	Mansfield, Hesse, Eisleben, &c.
10. P. magnus .	Zechstein . .	Mansfield.
11. P. macropomus	Zechstein . .	Mansfield.
12. P. elegans .	Lower part of Magnesian Limestone	East Thickley in Durham.
13. P. Robisoni .	Carbonif. limestone	Burdiehouse (near Edinburgh).
14. P. striolatus .	Carb. limest.	Burdiehouse.
15. P. ornatissimus	Carb. limest.	Burntisland (Fife).
16. P. comtus . .	Magnes. limest.	Durham.
17. P. glaphyrus .	Magnes. limest.	Durham.
18. P. macrophthalmus	Magnes. limest.	Durham.
19. P. longissimus	Magnes. limest.	Durham.
20. P. carinatus .	Carbonif. series	Newhaven (near Edinburgh).

The researches of Agassiz have given a simple and beautiful generalization of the distribution of these species; the scales of the Palæonisci, which abound in the coal formation, are almost universally smooth; those of the species which belong to the magnesian limestone are almost universally striated or sculptured. We find a few exceptions to this rule, as at Burdiehouse, and at Ardwick near Manchester, but it rests on a considerable number of coincidences. It is an unexpected result of Agassiz's critical inquiry into the forms of fossil fishes, that the Palæonisci of the English magnesian limestone are not identical with those of the zechstein of Germany, notwithstanding the supposed contemporaneity of the rocks.

PALÆORNIS. [PSITTACIDÆ.]

PALÆOSAU'RUS, the name given by Dr. Riley and Mr. Samuel Stutchbury to a genus of fossil Saurians discovered in the magnesian conglomerate on Durdham Down, near Bristol (1834).

The conglomerate wherein the Saurian remains were found rests upon the edge of inclined strata of mountain limestone, filling up the irregularities of their surface, and consists of angular fragments of the limestone cemented by a dolomitic paste. The thickness of the deposit where the remains were discovered does not exceed twenty feet.

Three animals were found, two belonging to the genus *Palæosaurus*, and the other to a genus named by them *Thecodontosaurus*. [THECODONTOSAURUS.]

Generic Character of Palæosaurus.—Teeth compressed laterally, and finely serrated at right angles to the axis, differing from those of all the known Saurians.

Species.—The teeth in the possession of the authors exhibit minor marked characters, and they have accordingly considered them as belonging to two species, *Palæosaurus cylindrodon* and *P. Platyodon*. (*Geol. Proc.*, 1836.)

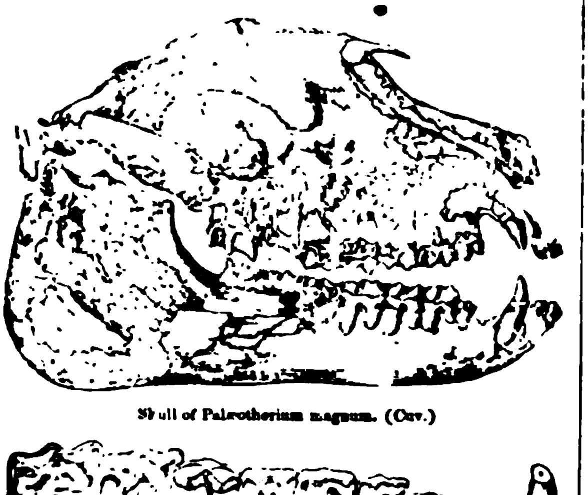
PALÆOTHE'RIUM, Cuvier's name for an extinct genus of Pachydermatous *Herbivora* discovered in the gypsum beds at Paris in company with *Anoplotherium*. [ANOPLOTHERIUM.] The discovery and definition of these and other Pachydermic forms, now utterly swept away from the face of the globe, form one of the noblest triumphs of the great French zoologist, who, from confused fragments huddled together pell-mell, separated the different bones, and, so to speak, gradually built up the framework of the lost animals, till their osseous structure and place in the chain of created beings became as well known as those of the animals that dwell upon the earth at the present day.

'It is not easy,' says Dr. Buckland (*Bridgewater Treatise*), 'to find a more eloquent and striking acknowledgment of the regularity and constancy of the systematic contrivances that pervade the animal remains of the fossil world, than is contained in Cuvier's introduction to his account of the bones discovered in the gypsum quarries of the neighbourhood of Paris. It affords, to persons unacquainted with the modern method of conducting physical researches, an example of the kind of evidence on which we found our conclusions as to the form, character, and habits of extinct creatures that are known only through the medium of their fossil remains.'

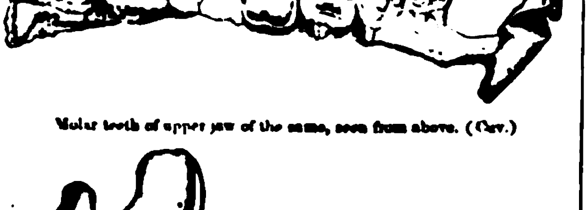
The striking passage alluded to by Dr. Buckland, after stating by what slow degrees the Parisian cabinets had been filled with innumerable fragments of bones of unknown animals from the quarries of Montmartre, thus describes the mode in which Cuvier worked out the task of reconstructing their skeletons. He had already ascertained that there were numerous species belonging to many genera; and we shall now let this prince of comparative anatomists speak in his own person. 'I at length found myself, as if placed in a charnel-house, surrounded by mutilated fragments of many hundred skeletons of more than twenty kinds of animals piled confusedly around me: the task assigned to me was to restore them all to their original position. At the voice of comparative anatomy every bone and fragment of a bone resumed its place. I cannot find words to express the pleasure I experienced in seeing, when I discovered one character, how all the consequences which I predicted from it were successively confirmed. The feet accorded with the characters announced by the teeth; the teeth were in harmony with those previously indicated by the feet. The bones of the legs and thighs and every connecting portion of the extremities were seen joined together precisely as I had arranged them before my conjectures were verified by the discovery of the parts entire. Each species was in short reconstructed from a single unit of its component elements.'

Generic Character of Palæotherium.—Dental formula: Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{7-7}{7-7}$ = 44. Three toes on each foot. A short fleshy proboscis, for the attachment of the muscles of which the bones of the nose were shortened, leaving below them a deep notch.

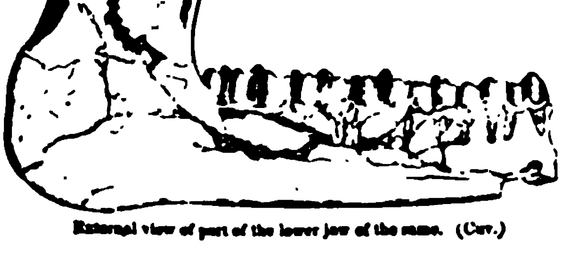
The molar teeth bear considerable resemblance to those of the Rhinoceros: in the structure of that part of the skull destined to support the short proboscis and the feet, the animal closely approached the Tapirs.



Skull of Palæotherium magnum. (Cuv.)



Molar teeth of upper jaw of the same, seen from above. (Cuv.)



External view of part of the lower jaw of the same. (Cuv.)

The species are numerous, and the following have been named:—*Palæotherium magnum* (gypsum of Montmartre), *P. medium* (gypsum of Montmartre, osseous breccia, Sète, &c.), *P. crassum*, *P. latum*, *P. curtum*, *P. minus*, *P. minimum*, *P. indeterminatum* (gypsum of Montmartre), *P. Aurelianense* (lacustrine formation of Orleans, Argenton, &c.), *P. Isselanum* (tertiary, Issel), *P. Velaunum* (tertiary, Puy-en-Velay).

Remains of *Palæotheria* have also been found in the tertiary formation near Rome, in the department of the Gironde, Provence, &c.

Mr. S. P. Pratt discovered, in the lower and marly beds of the quarries of Binstead in the Isle of Wight, which belong to the lower fresh-water formation, a tooth of an *Anoplotherium* and two teeth of the genus *Palæotherium*, animals characteristic of strata of the same age in the Paris basin. The remains found by Mr. Pratt were accompanied not only by several other fragments of the bones of *Pachyderms* (chiefly in a rolled and injured state), but also, in his opinion, by the jaw of a new species of *Ruminants*, apparently closely allied to the genus *Moschus*. From the occurrence of the latter fossil, Mr. Pratt infers that a race of animals existed at this geological epoch whose habits required that the surface of the earth should have been in a very different state from that which it has been supposed to have presented, in consequence of the frequent discovery of the remains of animals who lived almost entirely in marshes. (*Geol. Proc.*, 1830.)

Professor Owen, in his paper on *Chæropotamus* (1838), offered some remarks on the jaw discovered by Mr. Pratt in the Binstead quarries in 1830, and considered by him to be allied to the genus Moschus.* On comparing the jaw with the corresponding part of the *Moschus moschiferus*, which it resembles in size, Mr. Owen found that in the fossil the grinders are relatively broader, that the last molar has the third or posterior tubercle divided by a longitudinal fissure, that the grinding surface is less oblique, and that the coronoid process differs from that of the Moschus and other ruminants, but strongly bespeaks an affinity with the Pachydermata.

Professor Owen further remarked, that among the genera of the Paris basin established by Cuvier, the Dichobune exhibits characters which connect the Pachydermata with the Ruminantia, and thus exhibits another of those extraordinary unions of characters which in existing Mammals belong to distinct orders. In the Dichobune the posterior molars begin to exhibit a double series of cusps, of which the external present the crescentic form, so that the teeth of the *Dichobune murina* might be mistaken for those of true Ruminantia. In the lower jaw of the Dichobune the antepenultimate and the penultimate grinders have two pairs of cusps, and the last grinder three pairs, of which the posterior are small and almost blended together, so that when worn down they appear single.

In this respect, as well as in the form of the ascending ramus of the lower jaw, Cuvier states, in the 'Ossemens Fossiles,' that the Dichobune 'prodigiously resembles' the young Musk Deer.

Now with respect to Mr. Pratt's specimen, Professor Owen observed, that there is undoubtedly a close resemblance to the Musk Deer, but the differences are sufficiently great to forbid its being placed among the Ruminantia; while there is a still nearer resemblance between it and the genus Dichobune. The Isle of Wight specimen being somewhat larger than the *D. leporinum*, and the ascending ramus differing in form and approaching that of the true Anoplotheria, Mr. Owen considered that it indicated a new species, which, until the form of the anterior molars and incisors is known, might be referred to the genus Dichobune, under the name of *Dichobune cervinum*. (*Geol. Proc.*)

Geological Position.—The geological place of the extinct genus *Palæotherium* is in the first great fresh-water formation of the Eocene period of Lyell, where it is found with its congeners, of which nearly fifty extinct species were discovered by Cuvier.

Zoological Position, Habits, &c.—The zoological position of the genus appears to be intermediate between the rhinoceros, horse, and tapir. Their habits probably approximated to those of the tapirs. Dr. Buckland is not singular in thinking that these animals lived and died upon the margins of the then existing lakes and rivers. He is also of opinion that their dead carcasses may have been drifted to the bottom in seasons of flood, and that some perhaps retired into the water to die. The species varied greatly in size, some having been as large as a rhinoceros, and others having varied from the size of a horse to that of a hog.

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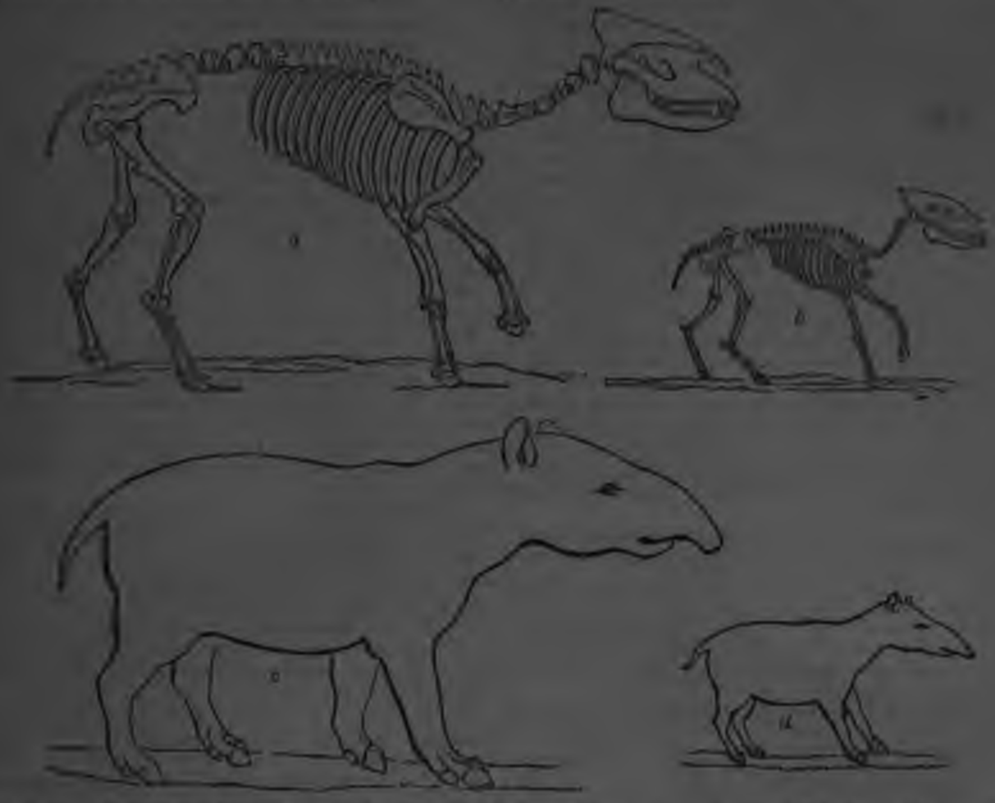
* 'Geological Transactions,' Sec. Ser., vol. iii., p. 431.

Examples, *Palæotherium magnum* and *Palæotherium minus*.

Palæotherium magnum.—Size of the skull equalling that of the largest horses.

Palæotherium minus.—Size of the skull smaller than that of the roe (Chevreuil).



a, restored skeleton of Palæotherium Magnum; b, restored skeleton of Palæotherium Minus; c, restored outline of Palæotherium Magnum; d, restored outline of Palæotherium Minus. (Cuv.)

PALÆOZOIC SERIES. The fossiliferous strata of earlier geological date than the carboniferous system, and the mountain limestone, are thus designated in the article ORGANIC REMAINS. One of the greatest impediments to a clear exposition of geological truths, is the difficulty of choosing proper general terms to suit classifications founded on limited researches. The antient terms of Primary, Secondary, and Tertiary Rocks will probably retain their popularity and applicability, because of the simplicity of the truly general idea which they contain in common—*the sequence of geological time*. In characterising and naming the subdivisions of these great groups of rocks, geologists have only partially followed out the same principle; every geological investigation of sufficient extent includes, as a principal point, the discovery of the relative antiquity of the subdivisions of Primary, Secondary, and Tertiary strata, but there is seldom an opportunity to frame a corresponding nomenclature, owing to the circumstance that general names, already and indeed long since proposed and adopted by the great body of geologists, cannot without great inconvenience be changed, even when new discoveries or wider generalizations demand their correction.

The term 'Transition' was applied to a large section of the Primary rocks, or else used to designate them as a separate class, at a time when true characters could by no means be assigned to them. Among Transition rocks, 'Grauwacke' was frequently seen. Hence the term Grauwacke System was commonly used to express a large portion (the upper) of the Primary series of strata.

In progress of rigorous investigation, the absence of organic remains from the gneiss and mica-schist rocks, and the occasional or ordinary presence of them in the grauwacke series, became generally admitted, and hence the convenient classification of Mr. De la Beche of 'Fossiliferous' and 'Non-fossiliferous' Primaries, the former being in fact an equivalent term for 'Transition Strata.' Recent researches into the succession of the fossil plants and animals of these earliest strata have produced very strong evidence for believing that, from the Snowdonian slates, placed by Professor Sedgwick in the lower part of the Cambrian system, to the lower beds of the old red-sandstone (at least), one system of organic life prevails—characterised by the preponderance of corals, such as Catenipora and Favosites, shells of Brachiopoda and Cephalopoda, and crustacea of the trilobitic types. It is true that when separate strata, included within the limits of geological time just stated, are compared in respect of their organic contents, distinctions more or less marked appear (as for example, conspicuously in the strata of the Silurian system), yet these mostly turn on minor differences of some of the analogous forms, and may perhaps have only a local value, as we know to be the case in the instance of the oolitic strata.

On the contrary, if we compare the whole series of organic forms found in these Palæozoic Strata, as they are exhibited in Wales or Cumberland, with the whole series of fossils discovered in the carboniferous system of the north of England or the border of Wales, we find not more than 1, 2, or 3 per cent. of intimately related species. The distinction between the Silurian fossils and those of the mountain limestone is of the same order as that which obtains between the latter series and the fossils of the magnesian limestone. Struck with this fact, Mr. Murchison has suggested for the early groups of strata the title of 'protozoic rocks,' which (beside one chance of ambiguity from the meaning attached in zoology to the word 'Protozoa') seems to assert more than is necessary, perhaps more than is known. We prefer therefore to apply to the same strata the title of Palæozoic, which seems liable to no objection, and which has, we believe, been occasionally employed by Professor Sedgwick.

Supposing, as we think likely, that general terms for stratified rocks, thus formed upon a consideration of their organic contents, which appear to follow a great law of succession, will be preferred to others based on a view of their mineral qualities, which are certainly subject to repetition, there will be no other difficulty in their construction or application than what may be overcome by the progress of investigation. As many systems or combinations of organic forms as are clearly traceable in the stratified crust of the globe, so many corresponding terms (as Palæozoic, Mesozoic, Kainozoic, &c.), may be made, nor will these necessarily require change upon every new discovery. For instance, the term Palæozoic may be retained, though it should be found that the application of it ought to be extended so as to include the carboniferous rocks or even the magnesian limestone ('Zechstein' of Germany). This indeed is not unlikely, for the following reasons. First, it is the opinion of eminent living geologists (Professor Sedgwick, Mr. Murchison, and others) that in strata which correspond in age to the old red-sandstone, there occur groups of organic remains intermediate in forms and combinations between the types of the Silurian and carboniferous æras. Secondly, it is ascertained that a large proportion of the forms of zoophyta, mollusca, and fishes, which appear in magnesian limestone, are extremely analogous to or even identical with some of the more numerous species of the mountain limestone. At present the Palæozoic series of rocks includes the following formations, placed in the order of position, according to the most recent views:—

Old Red-Sandstone.—This in whole or in part is supposed by Mr. Murchison and others to be represented by the calcareous, arenaceous, and argillaceous rocks of North and South Devon, Cornwall, part of Brittany, the Harz, Westphalia; and they prefer to call the series *Devonian*, from the county where it is supposed to be best developed.

Silurian Rocks.—Mr. Murchison ranks these in four formations, viz. Ludlow Rocks, Wenlock Rocks, Caradoc Rocks, Llandeilo Rocks.

Cambrian Rocks.—Professor Sedgwick subdivides them into Plynlymmon Rocks, Bala Limestone, and Snowdon Rocks.

It is supposed, but perhaps has not been perfectly ascertained, that the rocks of Skiddaw, &c., which come next in order below, are deficient of organic remains. May we propose for these and other lower stratified rocks the term 'Hypozoic Series?'

PALÆ'PHATUS. Four Greek writers of this name are mentioned by Suidas, the oldest of whom, an epic poet, a native of Athens, is said to have lived before the Homeric times. Suidas quotes the titles of several of his works, the 'Cosmopoea,' 'The birth of Apollo and Diana,' &c. The second was a native of Paros or Priene, who lived in the time of Artaxerxes Mnemon, and to him Suidas ascribes a work in five books entitled 'Of Things Incredible.' The third Palæphatus was an historian of Abydos, and a great friend of Aristotle. The fourth is called a grammarian of Alexandria by Suidas, and a Peripatetic philosopher by Tzetzes and others; the period in which he lived is not stated. Suidas mentions a work by him, entitled 'Explanation of Things related in Mythology.' This seems to be the work which has come down to us in one book divided into fifty short chapters, under the name of Palæphatus, and which is commonly entitled 'On Things Incredible.' The author explains, according to his fashion, the origin of the mythical fables, such as the Centaurs, Pasiphae, Actæon, &c., to which he attributes an historical foundation disguised or corrupted by ignorance or love of the marvellous. The best edition of the text is that of Fischer, Leipzig, 1789, in which he has given all the passages of antient authors concerning the various writers of the name of Palæphatus. A Latin translation of the work was published at Cambridge, in 1671, and a French translation was published at Lausanne in 1771. There are some other fragments under the name of Palæphatus which have been published with the work above mentioned, one on the invention of the purple colour, and the other on the first discovery of iron. (Vossius, *De Historicis Græcis;* Fabricius, *Bibliotheca Græca.*)

PALÆSTRA (*παλαίστρα*), which properly means a school for wrestling (*παλαίειν*, 'to wrestle,' and *πάλη*, 'wrestling'), was used in several different significations. The word first occurs in Herodotus (vi. 126, 128), who informs us that Clisthenes built at Sicyon a dromos and palæstra, both of which he calls by the general name of gymnasia. At Athens however it appears probable that the palæstræ and gymnasia were distinct places, and that the former were appropriated to the gymnastic exercises of the boys and youths (*παῖδες* and *μειράκια*), while the latter were intended for those of the men. These palæstræ were called by the names either of their founders or of the teachers of gymnastic exercises (*παιδοτρίβαι*). We accordingly read in Plato of the palæstra of Taureas, which appears to have been one of the most celebrated. (Plato, *Charmid.*, c. i.; with Heindorf's *Note.*)

In most of the other cities of Greece the Palæstra formed a part of the Gymnasium. According to Müller (*Archäologie der Kunst*, p. 344) it included the *σταδίων, ἐφηβεῖον, σφαιριστήριον, ἀποδυτήριον, ἐλαιοθέσιον, ἀλειπτήριον, κονιστήριον, κολυμβήθρα, ξυστοί, περιδρομίδες*, in fact every part of the gymnasium except the outer porticos. It appears however more probable that the term palæstra was confined to the rooms which were appropriated to the exercises of the athletæ, who, it must be recollected, were persons who were especially trained for contending in the public games, and therefore needed a course of gymnastic exercises different from that which was usually pursued. That this view of the subject is correct, is shown by the statement of Pausanias, who informs us (vi. 21, s. 2), that in the gymnasium at Olympia there were palæstræ for the athletæ, and also by that of Plutarch, who says (*Symp.*, ii., *Probl.* 4) 'that the place in which all the athletæ exercise is called a palæstra.'

Among the Romans the terms Palæstra and Gymnasium are used as synonymous. Thus Vitruvius gives a description (v. 11) of a Greek gymnasium under the name of palæstra. In the Greek cities in Sicily and Italy there also appears to have been no distinction in use between the two words (Cic. *in Verr.*, ii. 14; Polyb., xv., p. 716, c.; Casaubon); whence the Romans probably came to use them in common. [GYMNASIUM.]

PALAME'DEA (Linn.), a genus of birds placed by Mr. Vigors among the Grallatores, with its congeners *Parra*, *Chauna*, *Rallus*, and *Fulica*, in the family *Rallidæ*. The same author thinks that with *Parra* may be allied *Palamedea*, Linn., and *Chauna*, Ill. (the *Parra chavaria* of the 'Systema Naturæ'), both of which seem to approach Parra in affinity, although the latter of them is so imperfectly known, that its situation cannot be decided with certainty. (*Linn. Trans.*, vol. xiv.)

Mr. Swainson (*Classification of Birds*) gives *Palamedea* a position between *Megapodius* and *Dicholophus* in his family *Megapodinæ* (*Megapodidæ ?*), which comes immediately after the subfamily *Columbinæ* of his family *Columbidæ*, and terminates his order *Rasores*.

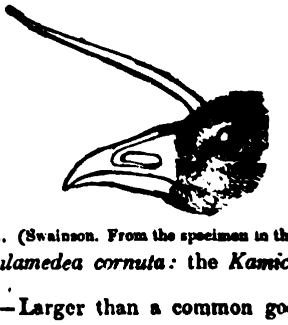
Cuvier places the form among his Macrodactylous Echassiers, or Waders (*Grallæ*, Linn.), between the *Jacanas* of Brisson (*Parra*, Linn.) [RALLIDÆ] and the Megapodes (*Megapodius*), under the title of *Kamichi* (*Palamedea*, Linn.), which contains *Palamedea* and *Chauna* of Illiger.

M. Lesson arranges the genus *Kamichi* (*Palamedea*, (Linn., *Anhima*, Briss.) under his family *Rallusinées*. *Palamedea* is immediately preceded by the Jacanas (*Parra*), and succeeded by the genus *Chavaria* (*Chauna*, Ill.), which last is followed by *Glareola*.

The *Palamedeidæ* then may be considered as a natural family consisting of the genera *Palamedea* and *Chauna*.

Palamedea.

Generic Character.—*Bill* shorter than the head, covered at the base with small feathers, conico-convex, slightly vaulted, hooked at the point. Forehead armed with a cylindrical *horn*, which is pointed.* *Nostrils* oval, open. *Wings* spurred, third and fourth quills longest. Anterior *toes* united at the base by a membrane; hallux touching the ground at the end.



Head of Palamedea. (Swainson. From the specimen in the British Museum.)

Example, *Palamedea cornuta:* the *Kamichi*, or *Horned Screamer*.

Description.—Larger than a common goose; greenish-brown above, except on the middle of the neck, which is variegated with black and white, and a large cinnamon-coloured spot on the shoulders; abdomen whitish; a long, spear-shaped horn projects from the forehead; wings long and pointed; tail wide and square; tarsi slender and reticulated, as well as the toes, which are long and almost entirely free; claw of the hallux nearly straight and very sharp; two spurs implanted on the edge of the wing.

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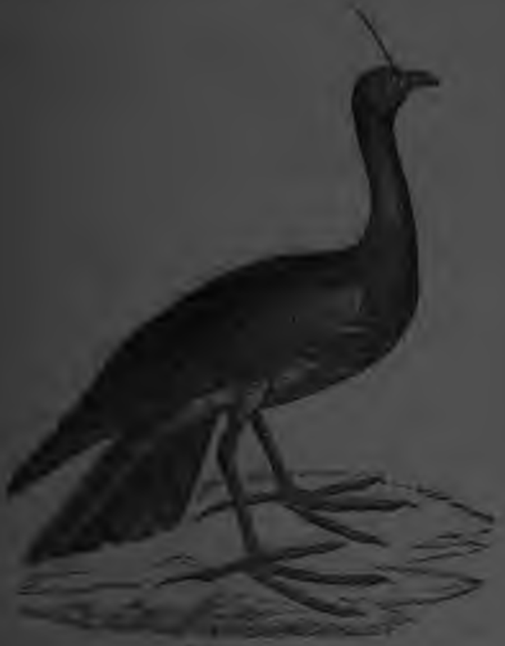
* Mr. Swainson states that he believes that this long spear shaped horn is moveable at its root. There is a large lancet-shaped spur on the upper and anterior process of the upper part of the larger portion of the metacarpal bone, and another on the lower edge of that portion. These are firmly fixed on a bony core; and there is also a small spur on the end of the smaller metacarpal bone.

This, the only known species, is the *Anhima* of the Brazilians, and, according to Cuvier, the *Camouche* of the people of Guyana; but M. Lesson thinks that it is the *Kamichi* of Buffon.

Habits.—This extraordinary bird lives in the marshy or inundated places in South America (Guiana and Brazil), which it makes resound with its wild and loud cry. Its food consists of grains and aquatic herbs, as its muscular stomach would indicate, though there are not wanting those who state that it hunts reptiles. It pairs, and lives faithfully with its mate.



Palamedea cornuta.

Chauna.

Generic Character.—*Bill* shorter than the head, clothed with small plumes at the base, semiconvex, slightly vaulted, curved at the point; head unarmed; lore naked. *Wings* spurred. External *toes* united at the base by a membrane; hallux touching the ground at the end; posterior and intermediate claws nearly straight. *Tail* graduated.

Example, *Chauna Chavaria*.

Description.—No horn; occiput ornamented with a circle of feathers capable of elevation; head and upper part of the neck downy; a black collar; the rest of the plumage lead colour and blackish, with a white spot on the bend of the wing and another on the base of some of the greater quills; hardly any part of the leg naked. Length of adult, 32 inches.

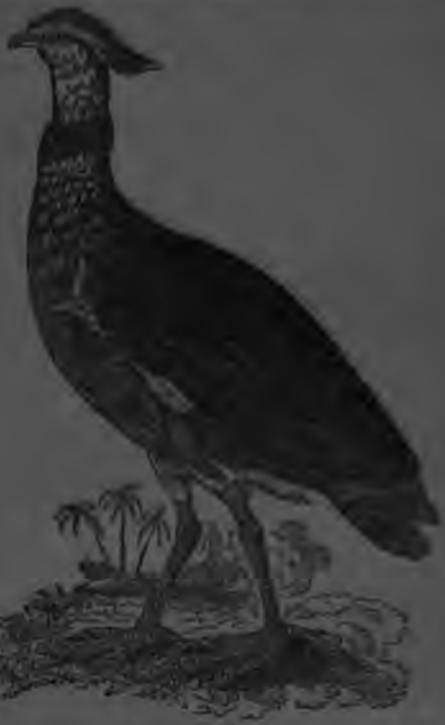
This is the *Chaña* or *Chajá* (a name, as we shall presently see, derived from the cry of the bird) of the people of *Paraguay*.

Habits.—D'Azara has given us many interesting particulars relating to this bird. Its sharp clarion-like cry is excited not only during the day, but also in the night, if it hears any noise. The note of the male is expressed by the word *Chajá*, and that of the female (for they answer each other) by the word *Chahali*. They are seen sometimes singly, sometimes in pairs, and at other times in numerous flocks. They principally, indeed ordinarily, frequent marshes, and if they are at any time found on the banks of rivers it is in places where the water is low and runs sluggishly. They do not swim, but enter the water like Herons, but not like them in search of fish or frogs, but for the submerged seeds of aquatic plants on which they live.

D'Azara saw some brought up among the domestic poultry at country-houses, and they were as tame as fowls. Those who kept them told him that the Chaña ate bits of raw meat, but he saw them picking the grass. They perch on the tops of the highest trees. On the ground they walk with gravity. Some state that the nests are spacious, and formed of small branches on bushes surrounded with water, and others that the bird places it in the rushes in the midst of the water. The eggs are laid in the beginning of August, and the young, which are two in number, follow their parents, though they are only clothed with down.

The Indians of Carthagena rear them among their geese and other poultry, under the idea that they will act as a guard, for the Chaña is very courageous and will drive away a vulture. D'Azara says that both this bird and the Kamichi are provided with a cottony down at the base of the feathers like swansdown; that the plumage of the neck is a little loose and inclining to downy; and that the skin of the neck is separated from the flesh by an interval of a line and a half, which is filled with cellular integuments, into which the air is introduced. The down at the base of the plumage is evidently calculated to keep up the proper temperature of the bird in its marshy home, and to repel the water when it wades so deep as to immerse the plumage.

Locality, Paraguay, on both banks of the Rio de la Plata, and in Brazil, far from human habitations.



Chauna Chavaria.

This genus *Chauna* was established by Illiger for the purpose of separating from the *Kamichi*, the *Parra Chavaria* of Linnæus, the *Chaña* of D'Azara. Cuvier, as we have seen, did not separate it from *Palamedea*, and M. Temminck, in his 'Analysis,' in mentioning the genus *Chavaria*, expresses his opinion that the *Chaña* ought not to form more than a species of *Kamichi*. The same author has subsequently, in his 'Planches coloriées,' placed it with that genus. Mr. Swainson arranges it as a species of *Palamedea* under the name of *Palamedea cristata*. The general opinion seems to be that the bird should be considered as a species of the genus *Palamedea*, and that the genus *Chauna* should be obliterated.

PALATE is the partition which separates the cavity of the mouth from that of the nose, forming the *roof* of the one and the floor of the other. In man it is composed of two portions, which are called respectively the hard and the soft palate: the *former* is made up of the inferior or palatine processes of each superior maxillary bone and palate bone, which, meeting in the middle line of the body, form a somewhat flattened arch over the mouth; the latter consists of a membranous curtain of muscular and cellular tissue, of which one margin is attached to the posterior border of the hard palate, and the other, with the uvula appended to its middle, hangs loosely backwards into the cavity of the pharynx. Both the hard and the soft palate are covered by a thin layer of vascular mucous membrane, immediately beneath which there are numerous minute glands. On each side, the soft palate is continued downwards in two diverging and arched membranous folds (the arches of the palate), which form the lateral boundaries of the fauces, and between which on each side the tonsil lies. Beneath these folds are muscles passing from the soft palate to the sides of the tongue and pharynx.

The hard palate serves as a firm support against which the food may be pressed by the back of the tongue during mastication; and it is by the various actions of the tongue upon it that we articulate several letters, as *d*, *g*, *j*, *k*, *q*, &c. The soft palate is capable of such motions by the contractions of its muscles, that it can either be raised so as to close the passage from the pharynx to the nose and Eustachian tube, or be depressed so as (with the assistance of the tongue) to close the passage from the pharynx to the mouth, or even to close both those apertures. By a simultaneous descent of the soft palate and contraction of the lateral arches by which it is connected with the tongue, the food when forced to the back part of the latter organ is impelled into the pharynx, constituting the first part of the act of swallowing. The soft palate is also of great importance in the actions by which substances are expelled from the digestive and respiratory organs through the mouth or nose, directing their passage, according to circumstances, into one or other of those cavities, as in coughing, sneezing, vomiting, &c.

The chief affection to which the palate is liable is that called cleft palate, a congenital malformation of the same nature as hare-lip [HARE-LIP], in which a fissure extends along more or less of the palate, and forms an unnatural communication between the mouth and the nose. Such a fissure may extend from the back of the teeth through the whole of both the hard and soft palates, or it may consist only in a small aperture in one or other of them. It may also vary in width, and may incline more or less to either side. According to its size, it produces inconvenience by allowing the passage of substances from the mouth to the nose, or in the opposite direction, and by impairing the speech by permitting the air impelled towards the front of the mouth to pass through the nose; hence the peculiar nasal and blowing sound by which the speech of persons thus affected is distinguished. Various operations have been proposed for the cure of this deformity. Those on the soft palate are conducted on the same principles as the operation for hare-lip, modified so as to meet the peculiar difficulties which arise from the position of the part. Those on the hard palate consist of either cauterising the edges of the fissure, or endeavouring to make a portion turned up from the adjacent membrane, to adhere to its edges. No operation however can be performed on the hard palate with any hope of success when the fissure is extensive; and the results of those on the soft palate are generally very uncertain. The patient must usually be contented with the palliation that is afforded by a false palate, which consists of a plate of gold or silver adapted to the roof of the mouth so as to cover the aperture in it, and fixed there either by springs and wires attached to the teeth, or by sponge passed through the aperture into the nostril.

PALATINATE, THE. There were formerly two states in Germany of this name, which, till 1620, were under one sovereign: they were not contiguous, and were called, by way of distinction, the Upper Palatinate and the Lower Palatinate, which was called likewise the County Palatine of the Rhine, or the Palatinate of the Rhine.

The Upper Palatinate was bounded by Bayreuth, Bohemia, Neuburg, Bavaria, and the territory of Nürnberg. In 1807 its area was 2730 square miles, and the population 283,733. The capital and seat of government was Amberg. It now belongs to Bavaria. It is a very hilly and in general barren country: its chief wealth consists in the forests and pastures, and in its mines and quarries: it does not produce sufficient corn for the consumption of the inhabitants.

The Lower Palatinate was situated on both sides of the Rhine, and was bounded by Katzenelnbogen, Würtemberg, Baden, Alsace, Lorraine, and Treves. The chief cities were Mannheim and Heidelberg. It comprehended the principalities of Simmern, Zweibrucken (Deuxponts), Veldenz, and Lautern, and the County Palatine properly so called. It belonged to the elector palatine; and notwithstanding the ravages which it has suffered at different times, it is one of the most fertile and flourishing countries in Germany. Its area is about 1600 square miles, and the population is now above 300,000.

It is hardly necessary to trace the history of a country which, after having undergone numerous changes, is now divided among different German sovereigns, and the very name of which has disappeared from the maps of Germany. A few lines will suffice. The Counts Palatine of the Rhine had obtained, so far back as the eleventh century, the hereditary sovereignty of the County Palatine and of its dependent principalities. The Upper and Lower Palatinate remained united under one sovereign till 1620, when the elector Frederick V., who had married the Princess Elizabeth, daughter of James I., king of England, having been induced to accept the crown of Bohemia, was defeated in a battle near Prague, on which he was declared under the ban of the empire, and deprived of his dominions and his electoral dignity, which were given by the emperor Ferdinand II. (his cousin) to Bavaria, which has ever since retained the Upper Palatinate. Charles Lewis, son of Frederick, recovered the Lower Palatinate by the treaty of Westphalia: he likewise obtained a new electoral dignity, the eighth, with the dignity of hereditary treasurer; but Bavaria retained the Upper Palatinate, the rank (the fifth place) which the Palatinate before held in the electoral college, and the dignity of hereditary archcupbearer. It was however stipulated that in case the male line of the house of Bavaria should become extinct, that country and the above-mentioned rights should revert to the Palatinate. In 1706 Maximilian Emanuel, elector of Bavaria, being placed under the ban of the empire, the elector palatine John William recovered the Upper Palatinate and the antient rights of his house; but the elector of Bavaria obtained all he had lost by the treaty of peace concluded in 1714 between the emperor Charles VI. and Louis XIV. The Bavarian male line becoming extinct on the death of the elector Maximilian III. in 1777, the elector palatine Charles Theodore succeeded to his estates (with the exception of a small portion which came to Austria), and transferred his residence to Munich. Conformably to the stipulations of the treaty of Westphalia, he recovered the fifth place in the electoral college and the dignity of hereditary archcupbearer, and gave up the dignity of hereditary treasurer to the elector of Brunswick. Charles Theodore dying without issue in 1799, he was succeeded by Maximilian Joseph, duke of Deuxponts. [BAVARIA.]

In the wars of the French Revolution, the French took possession of that part of the Palatinate which lay on the left bank of the Rhine, and retained it by the treaty of Luneville, 1801. Thus Deuxponts, Simmern, Veldenz, Spanheim, &c., and about 930 square miles of the Palatinate proper, were lost. The territory on the right bank of the Rhine, 650 square miles, with 141,000 inhabitants, and a revenue of 600,000 florins, were ceded by Bavaria in 1802, for other provinces. Baden obtained about 380 square miles, with the cities of Mannheim and Heidelberg, and 103,000 inhabitants; Hesse-Darmstadt, 116 square miles, with 9750 inhabitants; and the princes of Leiningen, 140 square miles, with 26,500 inabitants. By the treaty of 1819, Bavaria recovered the greater part of the territory on the left bank of the Rhine which it had lost in 1801. The remainder was allotted to Hesse-Darmstadt and Prussia.

PALATINE COUNTIES. Two of the English counties, Chester and Lancaster, are counties palatine, and the earls of Chester and the dukes of Lancaster bear the titles of counts palatine. The county of Pembroke, in Wales, was also formerly a county palatine; but its palatine jurisdiction was taken away by the statute 27 Henry VIII c. 26. The archbishop of York, previously to the reign of Elizabeth, claimed to be a count palatine within his possessions of Hexham and H[illegible]hamshire, in Northumberland, and is so termed in some antient statutes; but by the stat. 14 Eliz., c. 13, it was declared that this district had no palatine jurisdiction or privileges.

Counts palatine were of feudal origin; and a reference to their history will clearly explain the meaning of the title, and also many of the incidents of these territorial dignities in England. Selden says 'the name was received here doubtless out of the use of the empire of France, and in the like notions as it had in that use' (*Titles of Honour*, part [illegible]). In the court of the antient kings of France, before the time of Charlemagne, there was a high judicial officer, called the

Comes Palatii: a kind of master of the household, whose functions nearly resembled those of the Præfectus Prætorio in the elder empire. This officer had supreme judicial authority in all causes that came to the king's immediate audience. (Selden's *Titles of Honour*, part ii., chap. 5.) When the seat of empire was transferred to France, this title and office still continued, but the nominal dignity, as well as a degree of jurisdiction and power analogous to those of the ancient functionary, were also given to a different class of persons. When the sovereign chose to confer a peculiar mark of distinction upon the holder of a certain fief or province, he expressly granted to him the right to exercise the same rank, power, and jurisdiction within his fief or province as the comes palatii exercised in the palace. Hence he also obtained the name of comes palatii or palatinus, and, by virtue of this grant he enjoyed within his territory a supreme and peculiar jurisdiction, having royalties, or jura imperii, by which he was distinguished from the ordinary comes, who had only an inferior and dependent authority within his district or county. This was the origin of the distinction between the Pfalzgraf and the Graf in Germany, and between the count palatine and the ordinary count or earl in England. Selden says that he had not observed the word 'palatine' thus used in England until about the reign of Henry II.

In conformity with this view of their origin, the counts palatine in England had jura regalia within their counties, subject only to the king's general superiority as sovereign; or, as Bracton expresses it (lib. iii., cap. 8), 'regalem habent potestatem in omnibus, salvo dominio Domini Regis sicut principis.' They had each a Chancery and Court of Common Pleas; they appointed their judges and magistrates and law officers; they pardoned treasons, murders, and felonies; all writs and judicial proceedings issued and were carried on in their names; and the king's writs were of no force within the counties palatine. Many of these powers, such as the appointment of judges and magistrates and the privilege of pardoning, were abolished by the stat. 27 Henry VIII., cap. 24, which also provided that all writs and process in counties palatine should from that time bear the king's name. The statute however expressly stipulates that writs shall be always witnessed in the name of the count palatine.

The county of Chester is a county palatine by prescription, being commonly supposed to have been first given with regal jurisdiction by William I. to Hugh d'Avranches. (Selden's *Titles of Honour*, part ii.) It was annexed to the crown by letters patent, in the reign of Henry III., and since that time it has always given the title of earl of Chester to the king's eldest son, and is preserved in the crown as a county palatine when there is no prince of Wales.

The county of Lancaster appears to have been first made a county palatine by Edward III., who, in the twenty-fifth year of his reign, in his patent of creation of Henry, the first duke, granted him the dignity of a count palatine, and afterwards, in the fiftieth year of his reign, granted the same dignity by letters patent to his son John, duke of Lancaster. Henry IV. was duke of Lancaster, by inheritance from his father John of Gaunt, at the time of his usurpation upon Richard II., but he avoided the union of the duchy with the crown by procuring an act of parliament which declared that the duchy of Lancaster should remain with him and his heirs for ever, in the same manner as if he had never been king of England. Upon the attainder of his grandson Henry VI., soon after the accession of Edward IV., the duchy became forfeited to the crown, and an act of parliament passed to incorporate the county palatine with the duchy of Lancaster, and to vest the whole in Edward IV. and his heirs, kings of England, for ever. Another act of parliament passed in the reign of Henry VII., confirming the duchy to the king and his heirs for ever; and from that time to the present it has continually been united to the crown.

Durham, like Chester, is a county palatine by prescription; but it is probable that the palatine jurisdiction did not exist long, if at all, before the Norman Conquest. (Surtees's *History of Durham*, Introd., p. 15.) 'Some do please to think,' says Selden (*Titles of Honour*, part ii., c. 5), 'that the palatine jurisdiction began there in Bishop Walcher, whom King William I. made both episcopus and dux provinciæ, that he might frænare rebellionem gentis gladio, et reformare mores eloquio,' as William of Malmesbury says. Durham continued as a county palatine in the hands of a subject till the year 1836, the bishop having been prince palatine, and possessing jura regalia till that time. By the stat. 6 & 7 Will. IV., c. 19, the palatine jurisdiction was separated from the bishopric and transferred to his Majesty, and vested in him and his successors as a franchise separate from the crown, together with all forfeitures, mines, and jura regalia. The jurisdiction of the courts was expressly excepted from the operation of the act.

PALATINE MOUNT. [ROME.]

PALAWAN. [SULU ARCHIPELAGO.]

PALEMBANG. [SUMATRA.]

PALE'NCIA (PALLA'NTIA), a city in Spain, formerly belonging to the province of León, but now the capital of a province of its name. It is situated in a fertile territory, watered by the river Carrion, on the bank of which it stands. It contains several churches and convents built in the Gothic style, the most remarkable of which is the cathedral, consecrated to San Antolin, and supposed to be the foundation of Sancho the Elder. At the beginning of the thirteenth century Palencia had a university, established by the bishop Rodrigo, the author of a Latin history of the Arabs and several other chronicles; but in 1239 the university was removed to Salamanca. Palencia is the see of a bishop. Its population, in 1827, amounted to 10,413 souls. It contained also before that period eleven convents, now suppressed. The principal trade of the inhabitants consists of woollen cloths and blankets, of which a considerable exportation takes place every year for the neighbouring provinces of Castile. Palencia is 65 miles south-east of León, and 24 of Valladolid; in 41° 59′ N. lat. and 4° 34′ E. long.

(Miñano, *Diccionario Geográfico*, vol. vi.)

PALE'NCIA, ALONSO DE, a celebrated Spanish historian of the fifteenth century, was born, as appears from his work 'De Synonymis,' cited by Pellicer (*Bibliotheca de Traductores*, p. 7), in 1423. At the age of seventeen he became page to Alfonso de Carthagena, bishop of Burgos, and author of the 'Doctrinal de Caballeros,' printed at Burgos in 1487, in whose family he acquired an early taste for letters. He afterwards visited Italy, where he became acquainted with the learned George of Trebizond, whose lectures on philosophy and rhetoric he attended. On his return to his native country he was raised to the dignity of royal historiographer by Alfonso, younger brother of Henry IV. of Castile. After Alfonso's death he attached himself to the fortune of Isabella, and was employed in many delicate negotiations, particularly in arranging the marriage of that princess with Ferdinand of Arragon. [FERDINAND.] On the accession of Isabella to the throne of Castile he was confirmed in his office of national chronicler, and passed the remainder of his life in the composition of philological and historical works, and translations from the classics. The time of his death is uncertain; but he must have lived to a good old age, since it appears from his own statement (Mendez, *Typographia Española*, Mad., 1796, p. 190) that his version of Josephus was not completed till the year 1492. The most popular of Palencia's writings are his 'Chronicle of Henry IV.' and his Latin 'Decades,' containing the reign of Isabella down to the taking of Baza from the Moors in 1489, neither of which has been printed, although an edition of the former work is now in course of publication by the Spanish Academy of History. Palencia's style, far from the scholastic pedantry so common among the writers of his age, exhibits the business-like manner of a man of the world. His sentiments are expressed with boldness; but the scenes he describes, and in which he himself was an actor, are sometimes delineated with party feeling. He passes however for one of the best Spanish historians, and his works are very much commended by Zurita, Clemencin, and other critics. Besides the two above-mentioned historical works, Palencia wrote 'El Universal Vocabulario en Latin y Romance,' Sev., 1490; 'Los libros de Flavio Josepho,' ib. 1491; 'Las Vidas de Plutarco,' ib. 1491; 'El Espejo de la Cruz,' ib. 1485; and several other works still in manuscript. Two copies of his MS. chronicle of Henry IV. are in the library of the British Museum, Bib. Eg., Nos. 297 and 298.

(Prescott's *History of Ferdinand and Isabella*, vol. i., p. 133; Nicolas Antonio, *Bib. Hisp. Vetus*, vol. ii., p. 327; Clemencin, 'Elogio de la Reyna Católica,' in the sixth volume of the *Mem. de la Acad. de la Hist.*)

PALENQUE. [MEXICAN STATES.]

PALERMO, *Intendenza*, or *Province of*, extends along the western part of the northern coast of Sicily, and is bounded on the east by the province of Messina, on the west by that of Trapani, and on the south by the provinces of Girgenti and Calatanisetta. Its area is reckoned at 1790 square miles. (Neigebaur.) The province of Palermo is divided into the four districts of Palermo, Corleone, Termini, and Cefalù, and according to the last census contained 475,570 inhabitants. It is the most populous of the seven administrative divisions of the island, and the population is yearly increasing. The surface consists partly of naked hills and partly of fertile valleys, among which that called the Conca, or 'shell,' of Palermo, is one of the finest regions in the world. The general slope of the ground is to the north, from the mountain-range, the Mount Nebrodes of the antients, which crosses the island from east to west, to the sea-coast. Numerous short watercourses run in that direction; they are dry, or nearly so, in summer, but become impassable torrents in the rainy season. The principal are the river Termini, the Fiume Torto, and the Fiume Grande between Termini and Cefalù. The principal productions of the country are corn, oil, oranges and lemons, manna, sumach, liquorice, almonds, pistachio nuts, and silk. Of late years manufactories have been established at Palermo, and in its neighbourhood of cotton and silk stuffs, straw-hats, soap, paper, and cream of tartar. The principal towns are: 1, Palermo. 2, Termini, a town of 15,000 inhabitants, with a harbour, a castle, and an old cathedral, in a fine situation: Mount Calogero, one of the principal summits of the Nebrodes ridge, rises behind it. The inhabitants of Termini are employed in the tunny, anchovy, and sardine fishery, and in maritime trade. The ruins of the antient Himera are about 12 miles distant. The hot mineral waters of Termini are much frequented, and supply the adjoining baths. 3, Cefalù, a town of 8000 inhabitants, built on the sea-coast at the foot of a high cliff, with a handsome collegiate church. 4, Corleone, an inland town, with 13,000 inhabitants, chiefly employed in agriculture. 5, Monreale, 5 miles west of Palermo, with 13,000 inhabitants, and a splendid Benedictine abbey, founded in 1174, the church of which has become the cathedral of the archiepiscopal see. It is rich in marble and paintings, and contains the tombs of the Norman kings William I. and II. 6, Carini, the antient Hyccara, 9 miles west of Palermo, the birthplace of the famous courtezan Laïs, has 6000 inhabitants. 7, Piana dei Greci, 15 miles south of Palermo, an Epirote colony, with about 5000 inhabitants and a Greek church.

The small island of Ustica, situated about 30 miles from the coast north by west of Palermo, contains about 1200 inhabitants. It has a small fort, and produces good wine.

PALERMO (the antient Panormus), the capital of the island of Sicily and the second city of the united kingdom of the Two Sicilies, is situated on the northern coast of Sicily, which here forms a deep bay between Capo di Gallo to the north-west and Cape Zafferano to the east. Palermo is situated in 38° 7′ N. lat. and 13° 22′ E. long., in a fine and fertile plain between two mountain ridges and the sea. The town is an oblong parallelogram, surrounded by walls furnished with bastions. It is rather more than four miles in circumference, the suburbs not included. A fine street, called Il Cassaro, a corruption of the Arabic word Al-kasr, 'the palace,' runs through its length from the sea to the royal palace, which is at the opposite or inland extremity of the town, and is crossed at right angles towards its middle by another handsome street, called Strada Macqueda. The square before the royal palace is adorned with a bronze statue of Philip IV. of Spain. Another smaller square, in the centre of the town, between the palace of the senate and the university, is decorated with a curious fountain enriched with statues and figures of various animals, which spout the water into several basins. The houses of Palermo are built nearly in the same style as those of Naples, with flat roofs and terraces, and balconies with Venetian blinds. The most remarkable buildings are the following:—1, The royal palace is an old building fortified like a castle, with a fine hall, a spacious court, and a splendid chapel, built by King Roger in 1129, and enriched with mosaics and with a fusion of alabaster, porphyry, and other valuable stones. On the summit of the palace is the Observatory, which was for many years under the direction of Father Piazzi, who discovered from it the planet Ceres in 1801. 2, The cathedral, a magnificent Gothic structure, built about the end of the twelfth century, is adorned with marble columns and statues; it contains the mausolea of King Roger, the Norman founder of the monarchy, of the emperor Henry VI., of his wife Constance, and their son Frederic II., the remains of each being deposited in a handsome porphyry urn. The great altar is very rich and adorned with lapis lazuli and gold. 3, The church 'del Gesù' is remarkable for its architecture and for the richness of its marble decorations, its paintings, and sculptures. Palermo has many other churches, most of which are deserving of notice, such as that of La Martorana, built in the twelfth century, in the Gothic or Saracenic style, those of the Teatini, of Olivella, of Santa Zita, S. Ignazio, S. Filippo Neri, all rich with marble, paintings, mosaics, &c. The church of the Capuchins is remarkable for its vaults, in which the bodies of the deceased monks and other persons are seen dried up standing in niches in various attitudes, and with their garments on, some being two or three hundred years old. The same display is exhibited in the Capuchin convent at Malta. 4, The university, founded in 1447, is attended by about 600 students, has a library of 40,000 volumes, a museum of antiquities, with some fine statues and a fine collection of Græco-Sicilian medals. The academy of the fine arts, annexed to the university, has a gallery of valuable paintings, chiefly bequeathed by the late prince of Belmonte. 5, Besides the great hospital, Palermo has several other hospitals, a foundlings' asylum, two monti di pietà, a new house for the insane, which is much extolled for its enlightened and humane method of discipline, an Albergo dei Poveri, or workhouse, and other beneficent institutions. 6, The palaces of the nobility, among which those of Princes Butera, Ventimiglia, and Trabia are the most remarkable. 7, The promenade along the sea-side, called La Marina, which leads to the fine public gardens called La Flora, with a botanical garden. Palermo has two theatres, several barracks for soldiers, and a castle, called Castello à Mare, which commands the roads. The harbour of Palermo is at some distance outside of the town, and is formed by an artificial mole, which however does not protect it effectually from the winds and waves.

Palermo is an archbishop's see, and the residence of the king's lieutenant-general over all Sicily. It has a supreme court of justice for the whole island, a court of appeal for the province, and a commercial tribunal. The province of Palermo contains 125 convents of men, inhabited by 905 professed monks, about 600 lay brothers or servants, and about 300 novices. The nunneries are also numerous. The religion is exclusively the Roman Catholic, and there is no Jewish synagogue nor Protestant chapel. For public instruction, besides the university, there are at Palermo a college, directed by the Jesuits, a house of education for young ladies, called 'Educandato Carolino,' a nautical school, and a veterinary college. There are a few elementary schools in the town, but there is no general system of elementary education in Sicily, nor are there any schools for females, except in the convents. (Serristori, *Statistica d'Italia*, 1836.)

The neighbourhood of Palermo contains many delightful villas and mansions of the nobility. The village called Bagaria, on the sea-coast east of Palermo, is remarkable for several of these, and especially for that of the Prince Palagonia, described by Swinburne, Brydone, and other travellers. In the opposite direction, west of Palermo, is the royal mansion and park of Bocca di Falco, beyond which is the handsome Benedictine convent of S. Martino, one of the wealthiest in Sicily, situated on a hill above a solitary and picturesque valley. The church is adorned with paintings and marble, and the convent contains a good library, a museum of Sicilian antiquities, and a collection of medals. The Mount Pellegrino, Mount Ercta of the antients, a strong position of the Carthaginians during the first Punic war, a broad rocky abrupt mass which rises north-west of Palermo, is a striking feature of the landscape. It is now famed among the natives for a grotto or cave which is said to have been the voluntary retreat of Santa Rosalia, a princess of the royal Norman blood, who in the bloom of her youth and beauty left the court of King Roger I. in order to lead a contemplative and ascetic life. The cave is become a sanctuary, and every year on the 15th July there is a solemn procession to this place from Palermo, and the town is illuminated for several days. This is the most brilliant season for seeing Palermo to advantage, as people flock to it from every part of the island.

At the foot of Mount Pellegrino is a royal park and preserve, called La Favorita, well stocked with pheasants and other game. The country-house called La Ficuzza be given also to the king, and was a favourite residence of the late King Ferdinand I. The other country residences near Palermo are those of Princess Butera, Villa Franca, Belmonte, and Valguarnera. Nearer to the town, in the suburb of Olivuzza, is a Saracenic castle called Zisa, raised by one of the emirs or governors of Sicily for his daughter, with Arabic inscriptions and other ornaments. Another castle of a similar style of architecture, called Cuba, lies farther on the road to Monreale, and is used as a cavalry barracks.

Two fine roads, the only carriage roads yet completed in Sicily, lead from Palermo, one to Monreale, and the other to Termini. The population of Palermo and its suburbs is reckoned at 140,000 by Ortolani ('Dizionario geografico della Sicilia,' 1819).

Palermo, under the name of Panormus (All-Port), was originally a Greek colony, though some pretend that the Phœnicians had previously a settlement on this spot. It afterwards became subject to the Carthaginians, until the first Punic war, when the consuls Aulus Atilius and C. Cornelius besieged and took the town. It afterwards became a Roman colony.

The Saracen emirs who ruled Sicily for several centuries made Panormus the capital of the island, and the Norman kings after them fixed their residence there. The Aragonese kings of Sicily resided at Palermo. When Sicily became united to the kingdom of Naples, Palermo lost its court, but retained the rank of capital of the kingdom of Sicily. During the late wars with the French it twice became a place of refuge to the Bourbon dynasty after their expulsion from Naples. Although somewhat fallen from its metropolitan splendour, it is still one of the finest, gayest, and most populous Italian cities.

(Mongitore, *Descrizione di Palermo Antico*, 1824-5; Scina, *Topografia di Palermo e suoi Contorni*; Valguarnera, *Discorso sull' Origine e Antichità di Palermo*; Inveges, *Annali della Città di Palermo*, 3 vols., fol., 1645-51.)

PALESTINE (*PALÆSTI'NA*) is the name commonly applied to the whole land anciently inhabited by the Israelites, including the country of the Philistines (Ptolemy, v. 16). It is derived from פְּלֶשֶׁת, *the land of the Philistines*. It was originally called the land of Canaan (*Exod.*, vi. 4). The Israelites themselves called it the land of Israel (ארץ ישראל, 1 *Sam.*, xiii. 19; 2 *Kings*, vi. 23; אדמת ישראל, *Ezek.*, vii. 2), and, with reference to the theocracy, the Holy Land (אדמת הקדש, *Zechar.*, ii. 16; 2 *Macc.*, i. 7), or the land of Jehovah (ארץ יהוה, *Hosea*, ix. 3; *Jer.*, ii. 7), and also the Promised Land (γῆ τῆς ἐπαγγελίας, *Heb.*, xi. 9). The Romans generally called it Judæa.

The precise boundaries of this country are not very well defined. It was adjacent on the south-west to the desert which lies east of the delta of Egypt, on the south and south-east to Arabia, on the east and north to Syria. Its frontier towns were Dan on the north and Beersheba on the south. On the west it is bounded by the Mediterranean Sea. Its southern boundary on the coast was a stream which is called in Scripture the River of Egypt (probably the brook of El-Arish), from the mouth of which the southern boundary extended eastward through the Arabian desert to a point about 25 geographical miles south of the Dead Sea. The northern boundary was formed by the mountains of Lebanon; the eastern by the river Jordan and its lakes. The country lay therefore between 31° 10′ and 33° 30′ N. lat., and between 34° 45′ and 35° 30′ E. long. Its length from north to south is about 150 geographical miles; its breadth increases gradually from the northern boundary, where it is not more than 20 miles, to the southern, where it is not less than 80; the average breadth is about 50 miles. This description applies to the country originally intended in Scripture by the term 'the Land of Promise,' &c.; but the name of Palestine is used in common in a wider sense, embracing a considerable territory to the east of the Jordan, the addition of which increases the average breadth to about 65 miles. The southern limit of this eastern territory was the river Arnon, which falls into the Dead Sea near its northern end. The whole country contained about 11,000 square miles, or about 3300 square miles more than the area of Wales.

In describing the physical geography of Palestine, we follow for the most part the 'Physical History of Palestine,' which forms a part of the 'Pictorial History of Palestine,' by the editor of the 'Pictorial Bible,' a work in which nearly all the information we possess upon the subject is collected.

Mountains.—Palestine is a very mountainous country. A mountain-range commences in Syria south of the Orontes, and stretches to the south as far as the sources of the Jordan, where it divides into two branches, which continue their course nearly parallel to each other, and enclose between them the valley of the Jordan and its lakes. These two ranges diverge from each other at the head of the Gulf of Akaba; the one running along the eastern coast of that gulf and terminating on the shores of the Red Sea; the other along the western coast of that gulf and terminating in the mountains of Sinai.

The mountains of Lebanon, which are a part of this mountain system, form the northern boundary of Palestine. They consist of two parallel ranges enclosing a fertile valley of the average width of fifteen miles, which was the antient Cœle-Syria (Hollow Syria), and is now called *El Bekaa* (the valley). The western range inclines towards the sea, and terminates at the mouth of the Leontes, near Tyre; the eastern extends southward into Palestine and divides into two branches, as above described. The name of Lebanon is applied in Scripture indifferently to either or both of these ranges: by the Syrian Greeks the western was called Libanus (now *Jebel-el-Gharbi*, the western mountain, or *Jebel Libnan*); and the eastern Anti-Libanus (now *Jebel-es-Sharki*, the eastern mountain). Lebanon is by far the highest part of the Syrian mountains. The summit of the western range is quite barren; but the lower slopes, especially on the western side, are inhabited and cultivated. Among the trees which grow upon them are the remains of the celebrated cedars of Lebanon. Anti-Libanus is in general not so high as the western ridge; but at the point where it divides into the two branches which enclose the basin of the Jordan, it rises above all the other summits of Lebanon, forming the *Jebel-es-Sheikh*, the Hermon of Scripture, whose summit is covered with perpetual snow. The height of these mountains has never been measured. The eastern range is more barren, and has fewer inhabitants than the western. As this range passes into Palestine, it diminishes in height, and becomes less rugged and more fit for tillage; but at the Dead Sea it consists of desolate rocks. Almost all the mountains of Palestine may be regarded as belonging to the two principal ranges which include the basin of the Jordan. The most remarkable are the following:—Mount Tabor, the highest mountain in Lower Galilee, stands on the north-east of the plain of Esdraelon. It is entirely detached from the surrounding mountains, and is nearly of an hemispherical figure. On its summit is a plain of about half an hour in circuit, which is enclosed by an antient wall. This mountain is said by an old tradition to have been the scene of our Saviour's transfiguration. A range of fertile hills about five miles south-south-west of Tabor is generally considered to be the Mount Hermon mentioned in the Psalms (*Ps.* xlii. 6; lxxxix. 12): it is called the Little Hermon, to distinguish it from the great peak of the same name in Anti-Libanus. To the south and south-east of Tabor are the mountains of Gilboa of Scripture (*Jebel Gilbo*), a sterile range of hills, about 1000 feet above the level of the sea: they bound the valley of the Jordan on the west for some miles. The range of Carmel, the termination of which forms the only very prominent headland on the sea-coast of Palestine, lies almost due west of Mount Tabor. The promontory in which it terminates encloses the Bay of Acre on the south, whence the ridge runs inland to the south-east till it joins the principal range. It is only of moderate height, and is covered with forests and grass. To the south of the plain of Esdraelon lie the mountains of Samaria, which are beautifully wooded, chiefly with olive trees, and covered with towns and villages. Of these mountains perhaps the highest are those of Ebal and Gerizim, which are separated from each other by a valley 200 or 300 paces broad. From these mountains were delivered the curses and the blessings of the Law. The Samaritans had their temple on Mount Gerizim, which they esteemed the holiest of mountains. Judæa, or the southern part of Palestine, is full of hills, which are divided by valleys and torrents, and are for the most part of moderate height. They are composed of a friable rock, particles of which are washed down by the torrents, and form terraces on the slopes of the mountains. In antient times these terraces were planted with the olive, the fig-tree, and the vine. At pre-tent the rocks are for the most part barren and desolate. In the eastern part of Judæa, on the borders of the Jordan and the Dead Sea, is a wilderness of mountains, the most rugged and desolate in all Palestine. This mountainous country, which is the highest in Judæa, bears the name of Quarantania, from a tradition that this was the wilderness in which Christ fasted forty days and nights: the highest summit among these mountains is called the Mountain of Temptation, and is pointed out by tradition as that from which the devil showed our Saviour the kingdoms of the world. The most mountainous part of Judæa is the district round Jerusalem. [JERUSALEM.]

Of the mountains on the east of the Jordan little is known. Beginning in the north at the *Jebel-es-Sheikh*, already noticed, we find the mountains continuing southwards for about twenty-five miles under the name of *Jebel Heish*, and terminating at a point about ten miles to the east of the lake of Gennesareth. To the south of this mountain, for about twenty-four miles, is an open country, equally divided by the river Jarmouk, and containing the pasture-lands of Argob and Bashan. To the south of this district lies the land of Gilead, the mountains of which are the most considerable on this side the Jordan: they are for the most part well wooded, chiefly with the oak and wild pistachio. To the south of the river Jabbok (*Zerka*) the mountains are less elevated though broader. About six miles to the south of the river Jabbok is a ridge running east and west for about seven miles, the name of which (*Jelaad*) bears a trace of the antient name of the country. As the principal chain approaches the latitude of the Dead Sea, it diminishes in breadth; and somewhat below the head of that sea it widens out again, and forms the mountains of Seir. [IDUMÆA.] Among the mountains at the head of the Dead Sea, and to the north of the river Arnon, was Nebo (probably *Attarous*), from the summit of which Moses was permitted to see the promised land.

Geology and Mineralogy.—'Limestone is the prevailing constituent of all the mountains of Syria, as well as of Asia Minor and Greece. The general character of the stone of the mountains which compose the great central ridges of Syria, or which ramify from them, is that of a hard calcareous rock, sonorous when struck, and of a whitish or pale yellow colour. It is in short a very hard kind of limestone, disposed in strata variously inclined, and, like all limestone strata, affording a great number of caverns, to which frequent allusion is made in the Scriptures. Some of them are capable of containing 1500 men, and there is one near Damascus which will even afford shelter to 4000.' (*Pict. Hist. of Palestine*, 'Phys. Hist.,' p. lviii.) In the extreme north of Palestine the calcareous rock is said by Burckhardt to be 'of considerable hardness, and of a reddish yellow colour.'

The limestone rocks of which Lebanon is composed are of a whitish colour, from which circumstance the name of the mountain is supposed to be derived. The strata (at least at one point noticed by Burckhardt) are horizontal, varying from a few yards up to thirty or forty yards in thickness. The rock which lines the valley of the Jordan and its lakes is of a texture much less compact than that of the mountains of Lebanon or of central Palestine; and it diminishes in compactness as we approach the Dead Sea. In the neighbourhood of *Om Keis*, to the south-east of the lake of Gennesareth, there is a considerable quantity of black basaltic rock among the calcareous stone which prevails on the east of the Jordan between the rivers Mandhur and Zerka. This black basaltic rock is also found in large quantities in the plain of the Haouran, farther to the east. In the mountains south of the Zerka the calcareous stone is interspersed with layers of sandstone of different colours, and large blocks of black basalt. The hills about Jerusalem are of a hard light-coloured limestone, which, as we approach the Dead Sea, is exchanged for white and greyish limestone of a looser texture, containing layers of a reddish micaceous stone (*saxum purum micaceum*). On the shores of the Dead Sea perpendicular strata of a reddish brittle earth are seen in several places. The black basaltic rock of the Haouran extends along the whole eastern border of the country. In the parts near the Jordan it is generally found in detached masses. Traces of basalt are also found on the west of the lake of Gennesareth. Slate is found about the Dead Sea.

In many places the hard calcareous stone is covered by rocks of a soft chalky substance containing corals, shells, and other marine exuviæ. In the chalky beds about the summit of Carmel are found hollow stones lined with sparry matter, which resemble petrified olives and other fruit. These 'lapides Judaici' (as they are called) are sold to pilgrims as an antidote against various diseases.

This chalky formation appears very conspicuously in the White Cape (*Ras el Abaid*) below Tyre, the Album Promontorium of the Romans.

There are indications of coal in various parts of Lebanon. At Cornale, east of Beirout, seams of coal are found of the thickness of three feet, which are worked under the direction of Mohammed Ali.

About the seaward bases of the Lebanon and Kesrawan mountains, and in other parts of Palestine, there are numerous fossil plants, fishes, and shells.

Palestine is abundantly supplied with salt from the Dead Sea and the Mediterranean. The water of the Dead Sea is intensely salt. Fragments and beds of salt are found about its shores. The salt is deposited in large quantities on the margin of the Dead Sea by the evaporation of its waters. Saltpetre is found in the district of the Haouran.

From the description which Moses gave of the promised land (*Deut.*, viii. 9), 'as a land whose stones are iron, and out of whose hills thou mayest dig brass (or copper),' we should expect to find indications of these metals; and that they were found in antient times appears from the frequent mention of them in the Jewish history. In modern times the mineral wealth of the country has been almost entirely neglected. Iron abounds in the Lebanon and Kesrawan mountains, and traces of it are found in other parts of the country. Of copper we have no information. Palestine possesses neither tin, lead, nor gold; but some traces of silver have been found. There are celebrated mines of asphaltum in the neighbourhood of Hasbeya, near the sources of the Jordan.

The indications of volcanic action are chiefly confined to the basin of the Jordan and its lakes; and they are most frequent about the lake of Tiberias and the Dead Sea. Hot springs, lava, and pumice-stone are found about the Dead Sea. There are hot-springs at Tiberias, on the western side of the lake of Tiberias, and at other places round the lake, which has itself a striking resemblance to the crater of a volcano. In the neighbourhood of the Dead Sea are still the mines of asphaltum (the 'slime pits') of which the vale of Siddim was full in antient times (*Gen.*, xiv. 10), and other traces of the 'brimstone, salt, and burning,' by which the cities of the plain were overthrown. Palestine has been the scene of repeated earthquakes. A very destructive one occurred in 1837.

Valleys, Plains, and Deserts.—From the general disposition of the high lands in Palestine, it follows that the chief valleys are longitudinal, and run from north to south. The transverse valleys have a general east and west direction, being formed by the offsets of the principal mountain ranges. The chief plain country is the low land along the Mediterranean on the west of the central range of mountains. The chief valleys are to the east of that range, and are the Bekka between Lebanon and Anti-Lebanon, the basin of the river Jordan and its lakes, and the great valley of Araba extending from the Dead Sea to the Ælanitic Gulf.

The flat country along the coast varies considerably in breadth, and is diversified by elevations which are offsets from the central mountains. The soil of this part of the country is very fertile, being composed of a rich brown mould. The climate along the coast is very warm. To the south of Cæsarea is the celebrated vale of Sharon, which is terminated in the neighbourhood of El Arish by a sandy desert (the wilderness of Shur and Paran) which extends westward to Egypt, and eastward to the peninsula of Sinai.

The country between the mountains of Libanus and Anti-Libanus formed the Cœle-Syria of the Greeks and Romans. Its length is about 90 miles, and its average breadth about 11: it is the richest and most beautiful part of Syria.

The great valley of the Jordan extends about 175 miles from the sources of the river in the north, to the southern extremity of the Dead Sea. It is bounded on both sides by mountains, which on the east rise almost precipitously from the bed of the river till near the head of the Dead Sea, where the valley becomes wider: on the west there is a fertile vale between the river and the mountains, averaging about a half or three-quarters of a mile in breadth, except at the lake of Gennesareth, where the mountains come close up to the shores. The valley of the Jordan is in fact a great longitudinal cleft, which traverses the country from north to south, and in its lowest part, the surface of the Dead Sea, is about 500 feet below the level of the Mediterranean. (*London Geog. Journal*, vol. viii., p. 250.) A recent traveller (*Russegger*) makes it 1400 feet below the level of the Mediterranean; but such a remarkable fact, which is opposed by other evidence, must be received with doubt. The valley is very warm, and as it also possesses abundance of water, it is singularly fertile. The name of the valley of the Jordan is usually restricted to the part between the lake of Tiberias and the Dead Sea (now called *El Ghor*), which is about 60 miles long, and 5 or 6 miles wide in the northern half, but it grows much wider towards the Dead Sea, near which it spreads out into the plain of Jericho on the west and the plains of Moab on the east of the Jordan. The plain of Jericho is about 15 miles long by 7 or 8 broad, and is bounded on the west by an amphitheatre of mountains, which, by concentrating the sun's rays, cause a great degree of heat in the plain, which is further increased by the sandy nature of the soil, and by the low level of the plain. The plain immediately surrounding the Dead Sea consists on the eastern side for the most part of a sandy desert, with a few cultivated spots; on the western side the soil is rich, the heat great, and water abundant; but on the immediate borders of the lake it is a dreary waste. The great valley of Araba, which extends from the south of the Dead Sea to the head of the Ælanitic Gulf, is not within the limits of Palestine properly so called.

The valleys of Galilee are generally small, but beautifully wooded. The valley of Abilene lies beyond the hills which skirt the coast between Cape Nakhoura and Acre. South-east of this is the valley of Zebulon, between 3 and 4 miles long by one broad, which contains some of the finest pasturage in the whole country. To the east of this, and about the same length, is the vale of Sepphoris. The vale of Nazareth is a kind of hollow enclosed by mountains on every side, and abounds with fig-trees and gardens. Behind the hills which bound the north-western part of the lake of Gennesareth is an extensive plain, forming a rich pasture-ground, which is much frequented by the Bedouins. It is called Dothan, from a village of that name.

On the borders of Galilee and Samaria lies the great plain of Esdraelon, called in Scripture the plain of Megiddo, and the valley of Jezreel. It is exceedingly fertile, and well adapted for growing corn. It has been the scene of some of the most remarkable battles recorded in the Jewish history, and of great battles in later times. Samaria is less mountainous than either Galilee or Judæa; it is beautifully wooded, and full of fertile plains. The valley of Jenin—through which lies the common route from Galilee to the city of Samaria—is about 10 miles long and 2 miles in its extreme width. About four miles south of Samaria is the vale of Shechem, between the mountains of Ebal and Gerizim, which is said to be watered by 365 springs. It opens east into a very fine plain which leads into the valley of Leban, after traversing which we enter into the kingdom of Judæa. This, at least in its present uncultivated state, is the least fertile part of all Palestine, being full of rugged mountains, and deficient in water and soil. The stony valley of Bethel lies about 9 miles to the north of Jerusalem. The valley of Jeremiah, to the north-west of Judæa, is long and narrow. It is connected by a narrow pass with the valley of Elah, which is pointed out by tradition as the scene of David's victory over Goliath. This is one of the pleasantest parts of Judæa. East of Jerusalem lies the valley of Jehoshaphat, about a mile in length and 200 yards in breadth. To the south of the city is the valley of the Son of Hinnom, or Gehenna, the ancient scene of the worship of Moloch: at the south-end of this valley is the spot which is supposed to be the Aceldama mentioned in the *Acts* (ch. i., ver. 19). To the south-west of Jerusalem on the road to Bethlehem lies the valley of Rephaim, which is upwards of 6 miles long. Near Hebron is the valley of Mamre, where was the sepulchre of Abraham. South of Jerusalem is the vale of Eshcol, about 10 miles long, celebrated for its grapes and [illegible]. Between the Dead Sea and the centre of Judæa are the deserts of St. Saba and Engeddi.

On the east side of the Jordan lie the rich pasture-lands of Argob and Bashan, extending from Mount Hermon to the river Jarmuk, a few miles south of the lake of Gennesareth. South of this was the land of Gilead, the limits of which are not precisely defined, but it may be considered as lying between the rivers Jarmuk and Jabbok. It is mountainous, and more so in the northern than in the southern part. Some portions of it are very fertile, and others are beautifully wooded. South of the Jabbok was the land of Moab, of which only a small part, that namely to the north of the Arnon, belonged to Palestine. This portion was occupied by the Amorites when the Israelites took possession of the country. [MOAB.]

The south of Palestine is skirted by the great sandy desert which extends to Egypt and Sinai. It bears various names, of which that of the Desert of Paran seems to be used in the widest extent. For a description of this desert the reader is referred to the *Pict. Hist. of Palestine*, 'Phys. Hist.,' p. cxlii.

Lakes and Rivers.—There are no considerable rivers on the sea-coast of Palestine, the greater number of the streams being only mountain torrents which flow down from the hills that run parallel to the coast. The Leontes (*Nahr Liettani*) is not, strictly speaking, a river of Palestine. It rises among the roots of the Lebanon mountains in the neighbourhood of Baalbec, and flows in a south-westerly course to the Mediterranean, into which it falls a little to the north of Tyre. The most important river of Palestine is the Jordan (*Sheriat-el-Kebir*), which rises nearly in the latitude of Tyre, and flows southwards through the valley between the two great mountain-ranges already noticed, and, after traversing the lakes of Samochonitis and Gennesareth, falls into the Dead Sea. Its source, or what is generally considered to be its source, is a cave on the north-east side of the village of Panias, or Banias. [BANIAS.] There are however three other springs which have been taken to be the true source of the Jordan, and perhaps this distinction might properly be assigned to a stream which rises in the hill of Tel-el-Kadi, about 3 miles north-west of Panias. After a course of about 15 miles, the river runs into the *Bahr-el-Houle*, the waters of Merom of the Old Testament, and the lake Samochonitis of Josephus. The size of this lake varies with the season of the year. Josephus makes it 7 miles long by half that breadth, which appears to be about the average size. The reeds which are used for writing grow on its margin. There are numerous water-fowl upon it, and it abounds in fish. The waters are muddy, and are said to be unwholesome.

After a course of 10 miles from the point where it quits this lake, the Jordan enters the *Bahr-el-Tabarieh*, the sea of Tiberias, or lake of Gennesareth, or sea of Galilee of the New Testament. The dimensions of this lake are stated by Buckingham to be from 12 to 15 miles long, and from 6 to 9 miles wide. It is surrounded by mountains, and all travellers describe its scenery as exceedingly beautiful. The water is cool and clear, and contains a great quantity of excellent fish. Its margin is the resort of innumerable birds. The course of the Jordan is distinctly traced in a smooth current right through the middle of the lake.

The Jordan flows from the southern angle of this lake through a narrow valley, which may be considered as the bed of the river, and the level of which is lower than that of the large valley around it, which we have before spoken of as the valley of the Jordan (*El Ghor*). This lower valley is about three-quarters of a mile in breadth, and is covered with trees and luxuriant herbage. In the winter it is inundated by the river. In the summer the Jordan is fordable in many places. Its course when it leaves the lake is very rapid, but it diminishes in speed as it proceeds. At its junction with the Dead Sea it is 200 or 300 feet broad. The whole course of this river is about 100 miles in a straight line, but not less than 130 miles if we take into account the windings of the stream.

The very remarkable lake which receives the waters of the Jordan occupies the site of the plain of Siddim, where stood Sodom and the other cities which God destroyed by fire in the time of Lot (*Gen.*, xiv. 3; xix. 24, 25). It is called in Scripture the Salt Sea, the Sea of the Plain, and the East Sea; the Romans called it the lake Asphaltites; and it now bears the name of the Dead Sea; it is called by the Arabs Bahr Lut. It is of an irregular oblong figure, lying nearly due north and south. The dimensions assigned to it by Josephus are 72 miles long by 18 broad; but this is generally considered too large an estimate. The waters and surrounding soil are so intensely impregnated with salt and sulphur, that no trees or plants grow on its banks, and no cattle can drink of its water. The consequence is that it is surrounded with that perfect desolation which has procured for it the name of the Dead Sea. It is said to contain no fish, but the accuracy of this statement is doubtful. Its surface is singularly still. The waters leave a saline crust on things of whatever kind they come in contact with, and the drift wood upon it becomes so intensely impregnated with salt that it will not burn. It sends forth sulphureous and bituminous exhalations, and at some seasons of the year its surface is covered with a dense mist. The water is perfectly clear, and nearly of the same colour as that of the sea, but much more salt and bitter, and of a much greater specific gravity. [Dead Sea.]

The following are the most important tributaries of the Jordan and its lakes. On the eastern side the Jarmouk (*Sheriat-el-Mandhur*), the Hieromax of the Romans, and the Jabbok (*Zerka*), both of which flow westward into the Jordan, the former entering it a little to the south of the lake of Gennesareth, the latter at a point about half-way between that lake and the Dead Sea; and the Arnon (*Modjeb*), which flows into the Dead Sea near its northern extremity, dividing Palestine from the land of Moab. On the western side, the brook Daphne, which flows into the lake Samochonitis; the brook which takes its name from the neighbouring town of Capernaum and flows into the lake of Gennesareth; the brook Aenon, which rises in the mountains of Ephraim and flows into the Jordan between the lake of Tiberias and the Dead Sea; and the brook Cedron, which flows from the Mount of Olives into the Dead Sea.

The chief rivers which fall into the Mediterranean are the Belus, which flows into the modern bay of Acre a little to the south of Ptolemais; the Kishon, which flows from Mount Tabor through the plain of Jezreel, and falls into the same bay at the foot of Mount Carmel; the Chorseus and Kanah, which fall into the sea on the north and south of Cæsarea respectively; the Jarkon, which falls into the sea at Joppa; and the Eshcol and Besor, which fall into the sea near Askelon and Gaza respectively. The extreme southern limit of the coast is formed by the river of Egypt, which is supposed to be the brook El-Arish.

Climate.—The climate of Palestine is temperate and the weather is not very variable. There are, properly speaking, only two seasons. The winter lasts from October to the beginning of April, and is distinguished principally by continual showers, which are called in Scripture the early and the latter rains. In summer, which lasts from June to September, there is a continuance of clear weather, with scarcely any rain; but very heavy dews fall in the night.

Population.—It is not easy to estimate the population of Palestine. A census taken in the time of David gave 1,300,000 men who could bear arms (2 *Sam.*, xxiv. 9), which would make the whole population amount to 5,000,000.

Political Divisions.—The political divisions of the country were very different at different periods of its history. The first notice we possess of the country is when Abraham came from Mesopotamia to dwell in it. It was then inhabited by the Canaanites, who were divided into the families of the Sidonians, Hittites, Jebusites, Amorites, Girgasites, Hivites, Arkites, Sinites, Arvadites, Zemarites, and Hamathites. Of these, the Sidonians inhabited the strip of coast about Sidon, between Lebanon and the Mediterranean, being a part of the district known in history under the name of Phœnicia [Phœnicia]; the Hittites dwelt about Hebron; the Jebusites about Jebus or Jerusalem; the Amorites in the mountains west of the Jordan; the Girgasites about the upper part of the river round Gergesa; the Hivites in the country to the north of Shechem; the Arkites around Arca, and the Sinites near them; the Arvadites in the little island Aradus; the Zemarites and Hamathites about Simyra and Hamath. The Philistines inhabited the sea-coast in the south-west of the country. [Philistines.] At this period God promised Abraham that he would give the land to his descendants. [Jews.] This promise was fulfilled in the conquest of the land of Canaan by the Israelites after their departure from Egypt. Upon that event Joshua divided the land by lot among the twelve tribes. Reuben, Gad, and half the tribe of Manasseh had their possessions on the east of the Jordan; the other tribes were located on its western side. Reuben was bounded on the south by the river Arnon, and on the north by the tribe of Gad, which inhabited part of the land of Gilead about the river Jabbok. On the north of Gad the half tribe of Manasseh extended to Mount Hermon and the sources of the Jordan. The whole of the southern part of the country, between the Dead Sea and the Mediterranean, was at first allotted to Judah; but this district being disproportionately large, the western part of it was given to Simeon and Dan. The small territory of Benjamin was bounded by Dan on the west, by Judah on the south, and by the Jordan on the east, and contained within its limits the city of Jerusalem. Ephraim possessed the country about Shechem, between the Mediterranean and the Jordan. To the north of Ephraim lay the second half of the tribe of Manasseh, also extending from the Mediterranean to the Jordan and on the coast as far north as Mount Carmel. Issachar had the valley of Jezreel, to the north and east of Manasseh. Zebulon lay next to the north, bounded by Asher on the west and by the lake of Gennesareth on the east. The land of Naphthali lay about the sources of the Jordan, north of Zebulon and east of Asher, which last tribe possessed the sea-coast about Tyre and a part of the valley of Lebanon.

These tribes, whose political relations have been treated of in the article Moses [vol. xv., p. 440], were united into one kingdom under Saul and David. By the conquests of David the territory of the Hebrews was extended to the north-east as far as the Euphrates, and to the south as far as the head of the Ælanitic Gulf. But his conquests, of which the greater part was speedily lost by his grandson Rehoboam, are never included under the name of Palestine. By the revolt of Jeroboam, Palestine was divided into the two kingdoms of Judah and Israel, of which the former included the territories of the tribes of Judah, Benjamin, Dan, and Simeon, having for its northern boundary a line drawn from a point on the Jordan a little north of the Dead Sea, westward to the Mediterranean at Joppa: the latter included all the rest of Palestine to the north of this line.

The kingdom of Israel was overthrown, and the people carried captive by the Assyrians. The country, being thus depopulated, was next inhabited by the neighbouring heathen people and by colonies from other parts of the Assyrian empire, who, mixing with the scattered remains of the tribes of Ephraim and Manasseh which were left about Samaria, formed the people spoken of in the New Testament as the Samaritans, who were regarded by the Jews as an impure race, and between whom and the Jews there always existed a strong mutual hatred.

In the year 588 B.C., Nebuchadnezzar overthrew the kingdom of Judah and carried the greater number of its inhabitants into captivity. Many were however left in the land as subjects of the Babylonish empire. Upon the conquest of Babylon by Cyrus, Palestine fell under the dominion of the Persians, under whom it was divided, for the purposes of government, into small circles (פֶּלֶךְ), each of which had its governor (שַׂר). By an edict of Cyrus, the Jews were permitted to return to Judæa and to rebuild Jerusalem and the Temple, but they still remained subject to Persia. When Alexander the Great invaded Asia, Palestine submitted to him without a struggle. After his death, the possession of it was the subject of fierce contests between the Greek kings of Egypt and of Syria. [Jews.] Having been driven to revolt by the oppressions of the Syrian kings, the Jews, under the leading of the Maccabees, recovered their independence and restored the kingdom of Judah. [Maccabees; Asmoneans.]

In the year 63 B.C. the country was conquered by Pompey, and it remained thenceforward in subjection to the Romans, by whom the part of it west of the Jordan was divided into the three provinces of Judæa, Samaria, and Galilæa. Judæa nearly coincided with the antient kingdom of Judah; its northern boundary was at the parallel of Joppa. Samaria extended to the north as far as the plain of Esdraelon. Galilee lay north of Samaria, reaching up to Lebanon, and having Phœnicia along its western coast; it was divided into Upper and Lower Galilee, the former containing the northern and the latter the southern half of the province. The former was also called Galilee of the Gentiles, as it was inhabited by Syrians, Greeks, Phœnicians, and Egyptians, as well as Jews. On the east of the Jordan lay the province of Peræa, between the Arnon and the Hieromax, and to the north of this the districts of Batanæa, Trachonitis, Auranitis, and Gaulanitis, which commonly had one governor with Palestine. The whole country was considered by the Romans as a part of Syria, though it sometimes had a separate governor.

Under Constantine, Palestine was divided into Prima, Secunda, and Tertia. Palæstina Prima included the country of the Philistines, Samaria, and the northern part of Judæa; its capital was Cæsarea. Palæstina Secunda included Galilee and part of the country east of the Jordan; its capital was Scythopolis. Palæstina Tertia (also called Salutaris) contained the southern part of Judæa and the whole of Idumæa; its capital was Petra.

Towns and Villages.—In Upper Galilee, near the sources of the Jordan, was Dan, more anciently called Laish, the most northern town of Palestine. In its immediate neighbourhood stood, in the time of the Romans, Cæsarea Philippi, or Paneas. At the point where the Jordan enters the lake of Gennesareth stood Bethsaida. This city was beautified by Philip the Tetrarch, who called it Julias. On the western side of the same lake were Capernaum, Chorazin, and Magdala. On the same side of the lake, but in Lower Galilee, was Tiberias (*Tabarieh*), to the west of which lay Cana (Kanna), and farther to the west Sepphoris (*Saffureh*), the principal city of the district; it was enlarged by Herod, who called it Dio-Cæsarea; south-east of Sepphoris was Nazareth (*Nassrah*). Near the source of the Kishon was Nain. The city of Esdraelon, the ancient Jezreel, stood in the great plain of the same name. West of it was Shunem. In the south-east corner of Galilee was Bethshan, or Bethsan (*Bisan*), afterwards Scythopolis.

The most ancient city of Samaria was the Shechem, or Sichem, of the Old Testament, the Sychar of the New, which stood in the valley between Mounts Ebal and Gerizim. The Romans erected close to it the city of Neapolis, which still retains the name of *Nablous*. Near to Shechem on the south-east was Jacob's well. A few miles to the north of Shechem lay Samaria, which was built by Omri, who transferred the capital of the kingdom of Israel from Tirzah to this city. It was rebuilt and beautified by Herod, who called it Sebaste, in honour of Augustus, which name it still bears. In the time of the Romans the chief city of Samaria was Cæsarea Palestinæ (*Kaisarieh*), on the sea-coast, which was built by Herod on the site of an insignificant place called Turris Stratonis. On the coast, north of Cæsarea, was Dora (*Tortura*), and near it En-dor; south of Cæsarea was Apollonia (*Abu Khaled*), a Greek town. To the south-east of this was Antipatris, formerly called Capharsaba; and south of this was Saron, whence the vale of Sharon obtained its name.

The chief city of Judæa was JERUSALEM, in the neighbourhood of which were the villages of Bethphage and Bethany, on the Mount of Olives, and Emmaus (afterwards called Nicopolis), farther to the north-west. Near Emmaus were Aijalon and Gibeon; and farther to the north Ephraim and Luz or Bethel. To the east of Bethel, and in the north-eastern corner of Judæa, lay Jericho, which is sometimes called in Scripture the City of Palm-trees. Between it and the Jordan was Gilgal; south of Jericho was [illegible]. Bethlehem or Ephratah (*Bait-el-lahm*) was about five miles to the south of Jerusalem. To the south of Jerusalem lay Hebron (*El Khalil*). Joppa (*Jaffa*) was the frontier town of Judæa and Samaria on the sea-coast; to the east of it lay Lydda or Diospolis (*Lud*). South-east of Joppa was Arimathea (*Ramleh*), and near it Modin, the residence of Mattathias, the father of the Maccabees. On the east of the Jordan, in the district of Batanæa, &c., were [illegible] (*[illegible]*), Hippos on the lake of Gennesareth, Golan or Gilan, one of the cities of refuge, and Gamala, on the same lake. In the north of Peræa, near the lake of Gennesareth, was Gadara (*Um Keis*), and to the south-west of it Pella, built by the Macedonians, and farther south Gerasa, now *Jerash*, and Jabesh-Gilead. Jerash contains a large mass of noble ruins of the Roman period, consisting of fortifications, two baths, and a naumachia, which is now converted into a corn field. On the Jabbok stood Ramoth-Gilead, one of the cities of refuge, and on a branch of the same river Amathus (*Amata*). In the southern part of Peræa was Heshbon (*Esbus*), the chief city of the Amorites; farther to the west was Betharan, which was beautified by Herod Antipas, who called it Livias; near it was the citadel of Machærus, where John the Baptist is said to have been beheaded.

The modern history of Palestine is more conveniently included under SYRIA. The only portions of it which demand a separate notice have been treated of under CRUSADES. At present the country forms a part of Syria, being included under the pashaliks of Damascus, Akka, and Tripoli, and forming part of the viceroyalty of the pasha of Egypt.

PALESTRI'NA, the ancient *Præneste*, a town in the Campagna, 20 miles east of Rome, built on the south-west slope of a high hill, which is an offset of the Apennine ridge that limits the valley of the Tiber on the east, and divides it from the high land of Abruzzo. This ridge is intersected at Tivoli by the river Anio, which forces its way through it, and falls in a cascade. From Tivoli the ridge runs in a south-east direction to Palestrina, where it forms a promontory terminating abruptly towards the south, but connected, by some undulating and wooded elevations, with the more southern group of the Alban Mount. These elevations, on which stands the small town of Zagarolo, which gives a ducal title to the Roman family of Rospigliosi, form the watershed between the streams that flow westward to the Tiber, and the waters of the Sacco, which runs south-east to the Liris. The hill of Palestrina commands a view of both valleys, as well as of the Pomptine marshes to the south in the direction of Astura. In the mountains north of Palestrina is the town of Poli, the ancient Bola, and in the opposite or southern direction, in the valley of the Sacco, is Valmontone, the ancient Vitellia. Palestrina is naturally a strong position, and has been fortified from the oldest times. The ancient Præneste extended above the site of the present town, its citadel crowning the summit of the hill, and by its lofty position it deserved the epithet of 'frigidum,' or 'cool,' given it by Horace. There are some remains of the ancient walls built of large irregular blocks of stone. A church, dedicated to St. Peter, has been raised on the site of the citadel. The modern town of Palestrina is half way up the slope of the hill, on the site of the ancient temple of Fortune, and about 750 feet above the sea. Palestrina is a small town, with 3600 inhabitants, and some manufactures of coarse woollen cloth; it is also a bishop's see. The palace, belonging to the family of Barberini, contains the celebrated mosaic found among the ruins of the temple of Fortune, and transferred in 1640 by the Cardinal Francis Barberini to a hall of his mansion. It represents apparently an Egyptian festival on the occasion of the annual inundation of the Nile, with numerous figures of men and animals; among the latter are the hippopotamus, the ibis, and the giraffe. The names of the various animals are expressed by the side of each in Greek characters. It is the finest and most perfect ancient mosaic in existence. Some believe it to have been made in the time of the later Ptolemies; others ascribe it to the reign of Hadrian. The latter is the opinion of Barthélemy, in his 'Dissertation on the Mosaic of Palestrina.'

Præneste was a town of the Latins, and of older date than Rome. Tradition attributed its foundation to a certain Cæculus, who, according to Cato and Servius, was a leader of shepherds and robbers. In the war of the Latins against Rome after the expulsion of Tarquinius, Præneste is said to have forsaken the Latin Confederation and allied itself to Rome. (Livy, ii. 19.) More than a century later we find Præneste siding with the Volsci against the Romans, when the militia of Præneste advanced to the very gates of Rome, and occasioned a great alarm in the city. They were however defeated by T. Q. Cincinnatus the Dictator on the banks of the Allia, in the year of Rome 374, after which Præneste submitted to Rome by capitulation (Livy, vi. 28, 29); but it is not said upon what terms, and we find in the next year that Præneste and other Latin towns were again in arms against Rome. It is stated by Livy that Præneste had seven towns or villages under its sway, which were taken by Cincinnatus. Thirty years later, Præneste was included in the great Latin league against Rome, which was defeated by L. Furius Camillus; the territory of the Prænestini was confiscated (Livy, viii. 13-14), and their town became subject to Rome like the rest of Latium. [LATINI.] No colony however was sent to Præneste, and the inhabitants continued in the condition of a municipium without the Roman citizenship. In the civil wars of Marius and Sulla, and after the death of the former, young Marius, being defeated by Sulla, took refuge within the walls of Præneste, where, being besieged by L. Ofella, one of Sulla's lieutenants, he tried to escape by a subterraneous passage; but finding himself discovered by the enemy, he ordered a slave to run him through the body. The town then surrendered, when Sulla ordered an indiscriminate slaughter of all the inhabitants. Præneste does not appear to have been destroyed, but it remained long after in a desolate state; and Cicero, 'De Lege Agraria,' ii. 28, complains that the ager or territory of that town was in the possession of a few individuals. Octavianus Cæsar sent a colony of veterans to Præneste. The temple of Fortune was the great attraction of the place, and people repaired from all parts of Italy to consult the oracle, which gave its responses either by the voice of the goddess or in written answers made out of characters stamped on dice, which were drawn from an urn by a child, and arranged in the shape of sentences by the sortilegi, or soothsayers attached to the service of the temple. Cicero (*De Divinatione*, ii. 41) speaks at length of the 'Sortes Prænestinæ,' but shows his disbelief in them. The oracle continued however to be resorted to under the empire: it was consulted by Tiberius, who stood in great awe of it, and it was one of the latest oracles in Italy that continued to be applied to. The temple was built on a magnificent scale and richly adorned.

In the middle ages, Præneste, or Palestrina, became the chief stronghold of the powerful baronial family of Colonna, who often disputed with the popes the possession of the Campagna and of Rome itself. Boniface VIII. having excommunicated the whole family and their partisans, besieged and took Palestrina, and destroyed it; but after his death, the Colonna recovered and fortified it again. Eugenius IV., in 1437, retook it from them. At last Urban VIII. gave it to his relatives the Barberini.

Many statues and other remains of antiquity have been found at Palestrina: among others, the Antinous, called Braschi, from being excavated under the pontificate of Pius VI. (Braschi.) Præneste was a favourite residence of the wealthy Romans during the summer heats.

(Suaresi, *Prænestæ Antiquæ Libri Duo*, Rome, 1655, with plans of the antient town and the temple of Fortune; Cecconi, *Storia di Palestrina*, Ascoli, 1756, with several antient inscriptions; Petrini, *Memorie Prenestine*, Rome, 1795.)

PALEY, WILLIAM. The biographies of this eminent man are exceedingly scanty; indeed his life is marked with few events calculated to attract the attention of mankind. The early part of it was spent as a tutor in the university of Cambridge; the latter, in the calm pursuits of the philosopher and the unostentatious discharge of professional duties. Mr. Meadley, his personal friend, who published a Life of him soon after his death, is the authority for the following brief memoir.

Paley was born at Peterborough, in the year 1743. He was descended from an old and respectable family in Craven, in the West Riding of Yorkshire. During his infancy, his father removed to Giggleswick in Yorkshire, near the family property, having been appointed head master of King Edward's school in that place. He was educated under his paternal roof, and speedily distinguished himself by great abilities, a studious disposition, and a ripeness and discrimination of intellect. In his seventeenth year he was entered a sizar of Christ's College, Cambridge; on which occasion his father declared—a declaration which the event fully verified—that he would turn out a 'very great man,' for he had by far the clearest head he had ever met with in his life. He graduated in January, 1763, and was senior wrangler. Having taken orders, he was elected fellow of his college in 1766, and soon after became one of the tutors. In 1775 his friend Dr. Law, bishop of Carlisle, presented him to the rectory of Musgrove in Westmoreland. Shortly afterwards he married, left the university, and retired to his living. He passed through a succession of preferments, of trifling value, in the diocese of Carlisle; and in the year 1794, Dr. Porteus, bishop of London, made him a prebendary of St. Paul's, and Dr. Prettyman promoted him to the subdeanery of Lincoln cathedral. The year following, the bishop of Durham, Dr. Barrington, gave him the valuable rectory of Bishop-Wearmouth. His time was now spent between his subdeanery and his living, with occasional visits to Craven and Cumberland; and his life, unchequered by any events of importance, was occupied in the quiet performance of his duties, the society of his friends, and in completing that series of works which will perpetuate his name. The latter part of his existence was painfully subject to attacks of disease, which terminated in his death in 1805.

In matters of opinion, Paley was most liberal-minded and charitable; nor could he perceive either the utility of repressing free inquiry, or the justice of persecution for those diversities of sentiment which must ever characterise mankind. He was an able supporter of the principles of civil and religious liberty; and when Wilberforce and Clarkson commenced their labours for the abolition of the slave-trade, he strenuously exerted himself to suppress that disgraceful traffic.

As a writer, he is distinguished not so much for originality as for that power of intellect by which he grasps a subject in all its bearings and handles it in a manner entirely his own, for the consummate skill with which he disposes and follows out his argument, and for a style peculiarly suited to philosophical investigations—strong, exact, and clear, and abounding in words and phrases which, though sometimes homely, express and illustrate his meaning most for- and most distinctly.

The greatest and most important of his works, 'The Principles of Moral and Political Philosophy,' was published in the year 1785. The general outlines of it had been delivered as lectures to his pupils when he was a tutor in the university. Though in some respects faulty, the work is a most valuable addition to the literature of our country. His desire of introducing into the foundation of his system too much of the exactness of demonstrative science has occasionally led him to define things which in their nature are indeterminate—which cannot be brought within the limits of a precise and formal definition. His account of the *law of honour* and of *virtue* is of this character. Hence his applications are sometimes fettered and his conclusions defective. Both in his metaphysical and ethical views, Paley was a follower of Locke. Locke, in excluding innate ideas, overlooks innate capacities; and Paley denies the existence of a moral sense—of any faculty by which the mind is enabled to discriminate right and wrong.

This work is divided into two parts,—Moral Philosophy, and Political Philosophy. In the first part, after giving some account of the law of honour, the law of the land, and the Scriptures, as rules of action; rejecting the notion of a moral sense, or an innate capacity of moral judgment; and defining what he means by human happiness and virtue,—Paley proceeds to explain the principles and lay down the foundation of his system. This he does in book ii., 'On Moral Obligation.' A man is said to be obliged when he is urged by a violent motive resulting from the command of another. In moral matters, the motive is the expectation of future reward or punishment, and the command is from God. Hence private happiness is the motive, and the will of God the rule. But how is the will of God known? From two sources—the declarations of Scripture, and the light of nature; and the method of coming at the divine will concerning any action, by the light of nature, is to inquire into the tendency of the action to promote or diminish the general happiness. Here then Paley arrives at his principle, that 'whatever is expedient is right. It is the utility of any moral rule alone which constitutes the obligation of it.' Its utility is to be determined by a consideration of general consequences; it must be expedient upon the whole, in the long run, in all its effects collateral and remote, as well as in those which are immediate and direct. Having settled his principle, he proceeds to apply it to the determination of moral duties. He takes a three-fold division of duties: viz. those which a man owes to his neighbour, or relative duties; those which he owes to himself; and those which he owes to God. The first set are determinate or indeterminate: determinate, such as promises, contracts, oaths. The obligation to keep a promise, according to the principle of expediency, arises from the circumstance that 'confidence in promises is essential to the intercourse of human life;' and the sense in which a promise is to be interpreted is that which the promiser knowingly and willingly conveys to the mind of the person to whom it is made. Contracts are mutual promises, and therefore governed by the same principles; consequently, whatever is expected by one side, and known to be so expected by the other, is to be deemed a part or condition of the contract. Oaths are to be interpreted according to the *animus imponentis*, *i.e.* in the sense which the imposer intends by them. Indeterminate duties are charity, gratitude, and the like. They are called indeterminate because no precise and formal limits can be assigned to their exercise. Another class belonging to this first set of duties originate from the constitution of the sexes. The second set of duties are those which a man owes to himself. As there are few duties or crimes whose effects are confined to the individual, little is said about them. A man's duty to himself consists in the care of his faculties and the preservation of his person, and the guarding against those practices which tend to injure the one or the other. The third division of duties are those which are due to God. In one sense, every duty is a duty to God; but there are some of which God is the object as well as the author: these are worship and reverence.

The second part of this work is devoted to the elements of political knowledge. In determining the grounds of civil government and the reasons of obedience to it, Paley is guided by the same principle as that which constitutes the foundation of his moral system—*Utility*. The controversies on the origin of government have been many and bitter. Sir Robert Filmer and his followers, among whom the Oxford Tractators are the most prominent of the present day, hold the notion of a divine and inalienable right in kings:

powers, and the corresponding obligation of passive obedience in their subjects. They contend that God vested in Adam, the father of mankind, an absolute power over his posterity, and that this power descends without diminution to kings, the representatives of Adam. Locke, on the other hand, supposes a Social Compact, a compact between the citizen and the state, as the ground of the relation in which they stand to each other; a mutual agreement as to the terms of their connexion, and the conditions on which one undertakes to govern and the other to obey. Paley rejects both theories. He puts the divine right of kings on the same footing as the divine right of constables,—the law of the land. Against the Social Compact he urges that it is false in fact and pregnant with dangerous conclusions. The principle he assigns as the only reason of the subject's obligation to civil obedience, is the 'Will of God, as collected from expediency.' *Public utility* is the foundation of all government. Hence, whatever irregularity, or violations of equity or fraud and violence may have been perpetrated in the acquisition of supreme power, when the state is once peaceably settled, and the good of its subjects promoted, obedience to it becomes a duty. On the other hand, whatever may have been the original legitimacy of the ruling authority, if it become corrupt, negligent of the public welfare, and cease to satisfy the expectations of the governed, it is right to put it down and establish another in its place. After defining and giving some account of civil liberty, in which, as in every other part of his work, he adheres strictly to his principle—*utility*, which he follows out to its consequences,—he proceeds to speak of the different forms of government, especially the British constitution, their advantages and disadvantages, the nature of crimes and punishments, and the administration of justice.

With respect to religious establishments also, *expediency* governs all his views and conclusions. As no form of church government is laid down in the New Testament, a religious establishment is no part of Christianity; it is only the means of inculcating it. But the means must be judged of according to their efficiency; this is the only standard; consequently the authority of a church establishment is founded in its utility. For the same reason tests and subscriptions ought to be made as simple and easy as possible; and when no present necessity requires unusual strictness, confessions of faith ought to be converted into articles of peace. In establishing a religion, where unanimity cannot be maintained, the will of the majority should be consulted, because less evil and inconvenience must attend this than any other plan. On the same principle persecution is condemned and toleration justified; because the former never produced any real change of opinion, whilst the latter encourages inquiry and advances the progress of truth.

The book ends with the subjects of population and provision, agriculture and commerce, and military establishments. 'The final view,' observes Paley, 'of all national politics is to produce the greatest quantity of happiness.' In legislation, in government, in levying war, this is the ruling principle; and in relation to these questions, as in every other part of his work, he applies it with great skill and with a most masterly judgment.

In 1790 he published his 'Horæ Paulinæ,' certainly the most original of his works, and executed with singular ability. He here opens a new department of evidence in favour of Christianity. By a comparison of St. Paul's Epistles with the history of that apostle as delivered in the Acts, and by marking what he designates the *undesigned* coincidences of the one with the other, he establishes the genuineness of both, and thus furnishes a novel and ingenious and at the same time a very conclusive species of testimony in behalf of revealed religion.

His 'View of the Evidences of Christianity' appeared in 1794. In the composition of this work he availed himself largely of the labours of the learned Lardner and of Bishop Douglas, but the materials are wrought up with so much address and disposed with so much skill, and the argument laid before the reader in so clear and convincing a form, that it is one of the most valuable and important works of the kind. The argument, which is opened and illustrated with singular ability, is briefly this:—A revelation can be made only by means of miraculous interference. To work a miracle is the sole prerogative of the Supreme Being. If therefore miracles have been wrought in confirmation of a religion, they are the visible testimony of God to the divine authority of that religion. Consequently, if the miracles alleged in behalf of Christianity were actually performed, the Christian religion must be the true one. Whether the miracles were actually performed or not, depends upon the credibility of those who professed to be witnesses of them, that is, the Apostles and first disciples of Jesus Christ; and their credibility is demonstrated from this consideration,—'that they passed their lives in labours, dangers, and sufferings voluntarily undergone in attestation of the accounts which they delivered, and solely in consequence of their belief in those accounts; and that they also submitted, from the same motives, to new rules of conduct.' They could not have been deceived; they must have known whether Christ was an impostor or not; they must have known whether the miracles he did were real or pretended. Neither could they have been deceivers; they had no intelligible purpose to accomplish by deception; they had everything to lose by it. On the other hand, by being still—by letting the subject rest, they might have escaped the sufferings they endured. It is perfectly inconceivable, and entirely out of all the principles of human action, that men should set about propagating what they know to be a lie, and yet not only gain nothing by it, but expose themselves to the manifest consequences—enmity and hatred, danger and death.

His last great work, 'Natural Theology,' was published in 1802. Here, as in all the rest of his productions, the matter is arranged and the argument followed out with consummate judgment. His object is to establish the fact of benevolent design in the works of the visible creation. Hence the existence of a Supreme Designing Intelligence is inferred; and his personality, unity, and goodness demonstrated. It is not only one of the most convincing, but one of the most delightful books in the English language. 'One knows not,' says an ingenious writer, 'which to admire most, the judicious selection of instances, the happy disposition of the materials, the suitableness of the style, the skilful management of the general argument, the decisive confutation of the several atheistic schemes, or the impressive and weighty reflections with which it concludes.'

A very valuable and important edition of this work, with notes and scientific illustrations, was published a few years since by Lord Brougham and Sir C. Bell, the former furnishing a preliminary discourse of natural theology. The discourse is divided into two parts; the first contains an exposition of the nature and character of the evidence on which natural theology rests, with the intention of proving that it is as much a science of induction as either physical or mental philosophy; and the second is devoted to a consideration of the advantages and pleasures which the study is calculated to afford. Subjoined to the volume are some notes on various metaphysical points connected with the subject.

Besides these works, Paley was the author of various sermons and tracts.

Of his works published during his lifetime, an edition, by Lynam, appeared in 1825. A complete edition, in 4 vols., containing posthumous sermons, was published by his son, the Rev. Edmund Paley, in 1838.

PALIBOTHRA. [HINDUSTAN, vol. xii., p. 223.]

PALIGHAT. [HINDUSTAN, p. 204.]

PALIMPSEST MANUSCRIPTS (παλίμψηστα) are manuscripts from which the original writing has been erased or washed out, and which have been then written on again. This practice is as old as the time of Cicero, as appears from a letter of his to Trebatius (*Ad Fam.*, vii. 18), in which he praises his friend for having been so economical as to write on a palimpsest, but says that he should like to know what those writings could have been which were considered of less importance than a letter. (Compare Martial, xiv. 7.) The scarcity and expense of parchment, and the demand for the writings of the fathers and books of devotion in the middle ages, frequently induced the monks to erase or wash out the writings of the classical authors to make room for those of the fathers. In many cases however they were not able to obliterate entirely the antient writing; and a careful examination of some of these palimpsest MSS. has led to the discovery of some valuable works and fragments of the classical authors. Among the most important of these discoveries is the treatise of Cicero, 'De Republica,' which was found in the Vatican library at Rome by Angelo Mai in a MS. which had been re-written with the commentary of St. Augustin on the Psalms. The Institutions of Gaius were also recovered in a similar manner in the library of the chapter of Verona. The original MS. which contained the Institutions had been erased, as far as was practicable, and had been re-written with the works, chiefly the epistles, of St. Jerome. [GAIUS; PARCHMENT.]

PALINU'RUS (Zoology), the name given by Fabricius to a genus of crustaceans which forms the tribe of *Langoustiens* in the system of M. Milne Edwards, being the fourth of his family of *Cuirassed Macrurians*, and characterised by the existence of antennæ of the ordinary form and the absence of didactylous pincers.

The *Palinuri*, or *Sea-crawfish*, as they are popularly called, have the body nearly cylindrical. Their *carapace* is nearly straight from before backwards, very convex transversely, and presents about its anterior third part a deep transverse furrow, which is directed forward on each side and separates the stomachal from the cardial and branchial regions, the only ones which can be well distinguished. The anterior border of the carapace is armed with two stout horns, which advance above the eyes and the base of the antennæ. On each side, below the eyes and nearer to the base of the external antennæ, there is a more or less strong tooth. A great number of spines also nearly always arm the cephalothoracic buckler, over whose surface they are disposed. The ophthalmic ring is free and exposed; the eyes are large, short, and rounded. The antennular ring is very much developed, and advances between the external antennæ, below and in front of the ophthalmic ring; sometimes it is triangular, and much longer than it is wide, and sometimes it is nearly square. The *internal antennæ*, which spring from the lower part of its anterior border, are very long; their first joint is entirely cylindrical, and so are the two next joints; they terminate by two multi-articulate filaments of varying length. The *external antennæ* are very stout and very long; their basilary joint, in which the auditory apparatus is lodged, is very large, and is joined to its congener so as to form in front of the mouth a very large epistome; the three succeeding joints are stout, moveable, and thorny; they constitute the basilary portion of the antennæ, and are succeeded by a multi-articulate stem which is very stout and very long. The *external jaw-feet* are small and pediform; their internal border is only a little or not at all toothed, very obtuse, and furnished with bundles of hairs; their palp is very small or entirely wanting, but they give insertion to a large flabelliform joint. The second pair of jaw-feet are small and vary in the form of their palp; the first pair have a very large palp, which completes the efferent branchial canal forwards, and terminates sometimes by a styliform appendage, sometimes by an oval blade in the form of a spatula. The mandibles are very stout, their edge is trenchant, and their palpiform stem is very slender. The *sternal plastron* is of large size and composed of five segments joined together; it is very narrow between the first pair of feet, but is enlarged from before backwards, and presents on reaching the penultimate pair a very considerable width. All the *feet* are monodactyle; the first pair, which are in general shorter and a little stouter than the others, terminate by a short stout finger, which is not very moveable; sometimes there is at its base a spine, which is the vestige of a thumb, but these organs are never even subchelliform. The third pair of feet are, in general, longer. The *abdomen* is very stout and very long; its first ring has no appendages, but each of the four succeeding rings gives insertion to a pair of false feet, composed, in the male, of a small basilary joint and a large oval terminal lamina, whilst in the female there are two similar laminæ, or at least a single lamina and a stemlet which is biarticulate and furnished with hairs. The caudal fin, formed by the seventh abdominal ring and the appendages of that which precedes it, is very large, and each of the laminæ of which it is composed remains flexible and half-horny for its two posterior third parts, whilst above it is crustaceous like the rest of the tegumentary skeleton.

The *branchiæ* are composed of cylindrical filaments, which are short and close after the manner of a brush; there are eighteen on each side—two above the second jaw-foot, three above the external jaw-foot, three above the anterior foot, four above each of the succeeding feet, and one above the fifth foot. A large flabelliform appendage elevates itself between each of the bundles of branchiæ. (M. E.)

The genus is composed of species of considerable size, remarkable for the hardness of their crusts, and spread over all seas. Rocky coasts are their favourite haunts.

M. Milne Edwards divides the genus into the two following sections, and places the tribe which they constitute between the *Scyllarians* [SCYLLARIANS] and the *Thalassinians* [THALASSINIANS].

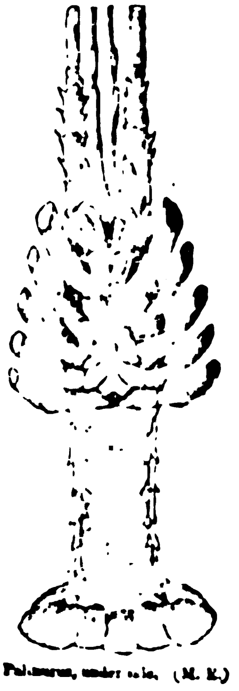
1.

Ordinary Palinuri.

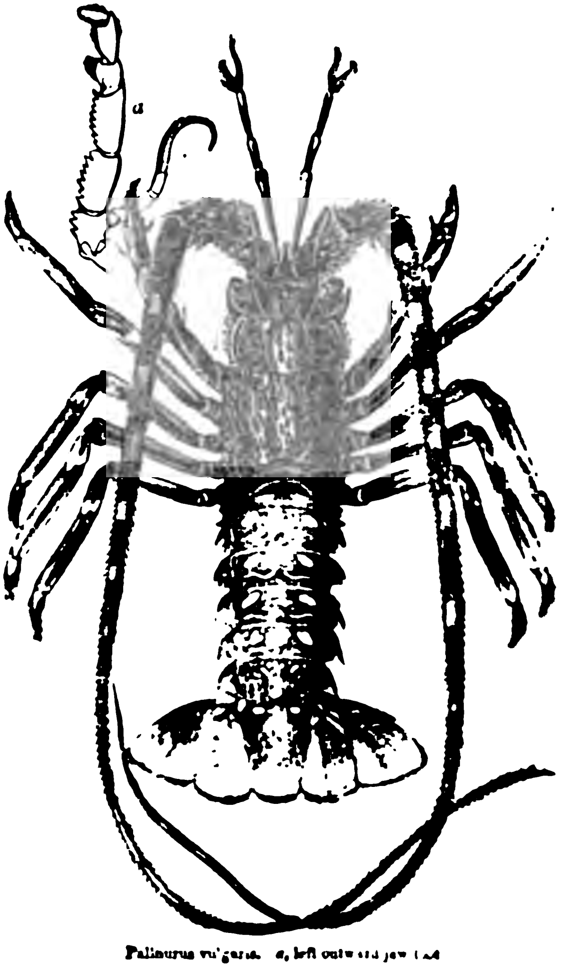
Distinguishable by the existence of a small, more or less projecting, median rostral tooth on the frontal edge of the carapace; a very narrow antennular ring, so that the external antennæ touch each other at the base, and cover the internal antennæ, which terminate by two very short multi-articulate stemlets.

Example, *Palinurus vulgaris*.

Description.—Lateral horns of the front smooth above



Palinurus, under side. (M. E.)



Palinurus vulgaris. a, left outward jaw foot.

and armed below with many sharp denticulations; carapace very spiny; subocular teeth on the border of the carapace very large. Abdomen almost entirely smooth, and presenting on the four rings which succeed the first, a transverse, deep, and hairy furrow, interrupted on the median line; the lateral prolongations formed by the angles of these rings, armed in their posterior border with three or four teeth situated near their base; two last rings of the abdomen spiny. Internal antennæ very slender and of moderate length. Anterior feet short and armed with a tooth at the extremity of the lower border of the penultimate joint. A vestige of an immoveable finger on the posterior feet of the female. First pair of abdominal false feet, in the female, furnished with two large oval laminæ, whilst those which succeed present only one lamina and a slender biarticulate appendage. Colour violaceous-brown spotted with yellow. Length about 18 inches. Weight sometimes from 12 to 15 lbs.

This appears to be the Κάραβος (*Carabus*) of Aristotle and the ancient Greeks, and the *Locusta* of the ancient Italian authors (*Rondeletius*, &c.) and of *Belon*. In the '*Portraits d'Oyseaux, &c.*' observez par P. Belon du Mans' (1557), is a cut of the crustacean, and under it the following lines, which allude to its name (*Locusta*), derived probably from its power of springing with the tail or abdomen:—

[illegible]

It is the *Common Sea-crayfish* of the shops, *Langouste* of the French.

Locality.—The seas of Europe. Common on the rocky coasts of Britain, especially in the south, and on the like coasts of France, especially on the south and west.

Utility to Man.—In general use as an article of food when in season, and as wholesome as the lobster; but though M. Milne Edwards states that the flesh is very much esteemed, the English specimens are certainly far inferior both in tenderness and delicacy of flavour to that of the last-mentioned crustacean.

The *Palinurus Rissonii* of M. Desmarest (green with white and reddish spots on the carapace and white lines on the abdomen), erroneously referred by M. Risso to *Palinurus fasciatus*, is in the last work of that naturalist (*Hist. Nat. de l'Europe Mérid.*) considered as a mere variety of *Palinurus vulgaris*.

Three other species of *Palinuri* are arranged by M. Milne Edwards under this section. Their localities are stated to be the Cape of Good Hope, Chili, and the Antilles.

γ.

Long-horned Palinuri.

No vestige of a median rostrum on the anterior border of the carapace; antennular ring very large and nearly square, so as to separate considerably the external antennæ, and to leave exposed the internal antennæ, which are terminated by two very long multi-articulate stemlets.

† Abdomen not furrowed.

Example, *Palinurus fasciatus*.

Description.—Antennular ring armed above with two conical rather large teeth situated near its anterior border. Carapace armed with a small number of spines, and slightly granular, or only dotted on its posterior half; lateral teeth of the anterior border of the carapace small; no spines on the median line of the stomachal region; median tooth of the anterior border of the epistome very large. Terminal appendage of the external jaw-feet oval. Abdomen smooth, finely dotted, and without transverse furrows; two or three small teeth towards the upper part of the posterior border of the lateral horns of the four abdominal rings which succeed the first. Feet slender. Colour greenish, with white [illegible] spots on the thorax, a white band near the posterior border of each abdominal ring, and many longitudinal whitish lines on the feet. Length about a foot.

Locality.—Indian Ocean.

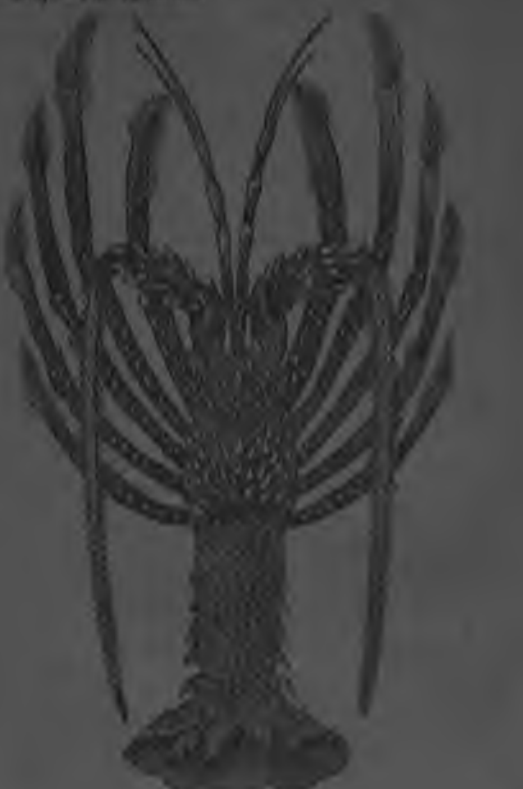
Two other species? one, *Palinurus ornatus*, from the Indian Seas and the Isle of France, and the other *P.* [illegible], from the coasts of India, come under this section. The latter may be, in the opinion of M. Milne Edwards, only a variety of the former.

†† Abdomen furrowed transversely.

Example, *Palinurus guttatus*.

Description.—Antennular ring armed with two very large conical teeth, sometimes preceded by two rudimentary spines. Carapace very spiny; two spines on the median line of the stomachal region near the base of the frontal horns; and on each side of these last, on the anterior border of the carapace, two teeth nearly as large as itself. Anterior border of the epistome armed with three nearly equal conical teeth, separated by a series of denticulations. Second pair of feet rather longer than the others. Abdomen smooth, and presenting towards the middle of each ring a transverse piliferous ring, which is not interrupted on the median line in the two first segments. A single tooth behind the base of the lateral horns of the abdomen. Colour green, with many circular yellowish spots; penultimate joint of the feet striated longitudinally with green and yellow. Length seven to eight inches.

Locality.—The Antilles.



Palinurus guttatus.

Five well-marked species from the seas of warm climates are also placed in this subsection by M. Milne Edwards, who observes that there is in the Paris Museum a foot of a *Palinurus*, which came from the Isle of France, appearing to belong to the third pair, and remarkable for its large proportions. This specimen leads to the presumption that there exists a gigantic species unknown to naturalists. The foot in question is more than two feet (French) in length.

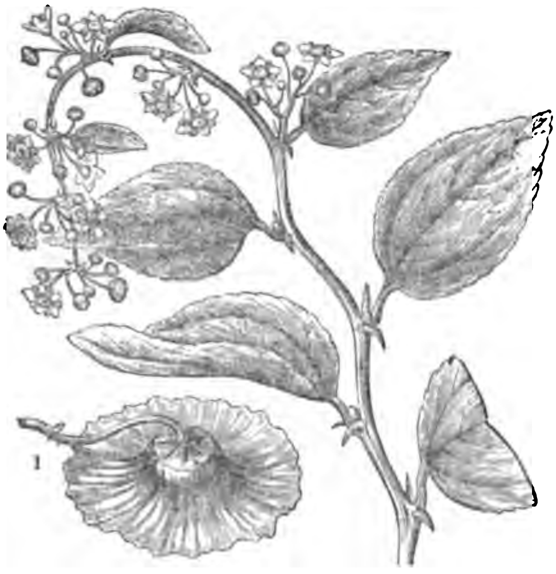
Fossil Palinuri.

M. Desmarest (*Crust. Foss.*) notices a large fossil crustacean from Monte Bolca, which evidently belongs to this genus, and is nearly of the same proportions as *Palinurus vulgaris*, but it is not sufficiently well preserved to identify the characters.

M. Milne Edwards further observes that M. Desmarest refers to this genus two other species of fossil crustaceans, but the former zoologist does not agree with the latter in opinion as to the relative affinities of these animals. *Palinurus Regleyanus* (Desm., *Crust. Foss.*) appears to M. Milne Edwards to have more analogy with the genus *Nephrops* than with any other macrurous crustacean; and *Palinurus Suerii* (Desm., *loc. cit.*), though evidently belonging to this *family*, does not, according to him, deserve to be considered as a true *Palinurus*, because the disposition of the regions of the carapace is very different. The upper part of the shell, instead of being divided into two portions only by a deep furrow situated in front of the branchial regions, is divided into three bands, the posterior of which is formed by the branchial regions, the anterior by the stomachal region, and the middle one by the highly developed hepatic or genital regions. There is also between this last portion of the carapace and the branchial regions a species of triangular shield, which represents the cardial region. The disposition of the rostrum is not observable, and it seems to M. Milne Edwards that when this fossil is better known it will form a distinct genus. It is from the muschelkalk.

M. Milne Edwards is also of opinion that the *Macraurites pseudoscyllarus* of Schlotheim, a fossil crustacean of singular structure, ought to be arranged under the family of *Cuirassed Macrurians*. The carapace is short, spiny, and terminated anteriorly by a small flattened rostrum; the antennæ are slender, and have an elongated peduncle. The first pair of feet are very stout, and spiny for two-thirds of their length, but appear to be terminated by a small nearly filiform didactylous hand. The succeeding feet are short, slender, and monodactyle. The abdomen is large, and nearly conformable with that of the *Palinuri*. One of the fossil Macrurians, he adds, figured in the *Oryctographia Norica* (pl. 8, f. 7), approaches nearly to the preceding. (*Hist. Nat. des Crust.*)

PALIU'RUS ACULEA'TUS, or AUSTRA'LIS, the Παλιούρι of the modern Greeks, is a small shrub, with flexuose shoots directed almost horizontally from the principal stem, and armed with short stiff curved spines, which grow in pairs from the base of the leaves. It has small shining ovate leaves, yellowish green clustered flowers, and a broad brown fruit, convex in the middle, but thin and uneven at the margin. It is common in the south-east of Europe and in Asia Minor, and is supposed to have been the plant from which the Jews platted the crown of thorns for our Saviour. In this country it is not uncommon in shrubberies, where it forms a beautiful bush when in flower, but it does not ripen its fruit. It is supposed to be the third sort of Ῥάμνος mentioned by Dioscorides, who compares the form of the fruit to that of a vertebra; if so the Παλιοῦρος of this author must have been something else, and perhaps, as Sibthorp conjectures, the modern Ζίζιφι, Ziziphus vulgaris, or Jujube.



Paliurus Aculeatus, or Christ's Thorn.

1, A ripe fruit, of the natural size.

PALL, a cloak or covering; more especially used for the ornamental article of dress granted by the pope to patriarchs and archbishops, made of white wool, in the form of a band three fingers broad, to surround the shoulders, having pendants a span in length before and behind, the ends ornamented with red crosses. The origin of the pall is obscure, but its use is of high antiquity. Tertullian, who lived at the beginning of the third century, wrote a treatise 'De Pallio.'

Sleidan, in his commentaries 'De Statu Religionis et Reipublicæ, Carolo V., Cæsare,' 4to., Argent., 1555, lib. xiii., p. 210, describes the ceremony of making the pall. He says, on St. Agnes day, Jan. 21, when, in the mass which is said in St. Agnes Church at Rome, they come to the words *Agnus Dei qui tollit peccata mundi*, two white lambs are laid upon the altar, which are afterwards given to the care of two subdeacons of St. Peter's Church, who put them out to grass, and in due time shear them; the wool obtained from these lambs, being mixed with other wool, is spun, and afterwards woven into these palls. Thus woven, they are carried to the bodies of St. Peter and St. Paul, and after certain prayers said, are left with them all night. They are then received again by the subdeacons and laid up till an archbishop who requires one of them comes either in person or by his proctor to demand it. The price at which they are purchased from the pope, he adds, is considerable: nor is it lawful for an archbishop to use his predecessor's pall. If by exchange, or in any other way, a patriarch or metropolitan is removed to another church, although he had purchased a pall before, he must still be at the charge of a new one. Before the receipt of his pall, an archbishop cannot perform the functions of his office, even if he has been translated; nor can the archiepiscopal cross be borne before him.

The original grant of the pall from Pope Julius II. to archbishop Warham is still preserved among the Cottonian manuscripts in the British Museum; the following is the form: 'Ad honorem dei omnipotentis, et beatæ Mariæ Virginis, et beatorum Apostolorum Petri et Pauli ac domini nostri Julii, pp. ij. et sanctæ Romanæ Ecclesiæ, necnon Cantuariensis Ecclesiæ tibi commissæ, tradimus tibi Pallium de corpore beati Petri sumptum, plenitudinis videlicet pontificalis Officii, ut utaris eo infra Ecclesiam tuam certis diebus qui exprimuntur in privilegiis ei ab apostolica Sede concessis. Aloisius.'

In the East the pall is called *omophorion* (ὠμοφόριον), and has been used at least since the time of Chrysostom, who was charged with accusing three deacons of taking his omophorion. (Photii *Bibliotheca*, edit. Par. 1611, p. 55.) It is worn by all the Eastern bishops, above the phenolion, or vestment, during the eucharist; and, as used by them, resembles the antient pall much more nearly than that worn by Western metropolitans, approaching nearer to the shape of a cope.

(Du Cange, *Glossar.*, v. 'Pallium.;' Picart's *Religious Ceremonies;* Palmer, *Origines Liturgicæ*, 8vo., Oxf., 1832, pp. 317, 318.)

PALLA'COPAS. [Tigris.]

PALLA'DIO, ANDRE'A, an Italian architect whose name has become almost proverbial through Europe, and whom many critics still consider as one of the great masters of his art, more especially in all that appertains to taste. He was born at Vicenza in the Venetian territory, a city which is distinguished by the numerous structures with which he adorned it. Of his family, his early youth, and his first studies, scarcely anything certain is now known. It appears however that he studied with great diligence the writings of Vitruvius and Alberti, and that he found an encouraging patron in his countryman Gian-Giorgio Trissino, whose name still holds a conspicuous place in the annals of Italian literature. By him Andrea was taken to Rome three several times, and he turned these opportunities to such excellent account that scarcely an antient edifice of any note escaped his examination, while of many of them he made drawings and studies, and carefully noticed their construction.

He appears to have returned from the last of these journeys in 1547, when he was in his twenty-ninth year, and to have settled at Vicenza. His first work, or rather one in which he had a share, was the Palazzo Publico at Udine, begun by Giov. Fontana, a Vicentine architect and sculptor, and by some supposed to have been Palladio's instructor; but the first work of any importance entirely designed by himself was the Basilica or Palazzo della Ragione at Vicenza, a large antient Gothic structure, the exterior of which he entirely remodelled. He surrounded it on three sides by open loggie or porticos, forming two orders, Doric and Corinthian, in half columns, each including a smaller order of insulated columns whose entablature forms the impost to the arches which occupy the upper part of the larger intercolumns. So great was the reputation he at once acquired by this edifice, that he was shortly after summoned to Rome by Paul III., who wished to consult him respecting the works then in progress at St. Peter's. He accordingly visited that city for the fourth time, but Paul died before he arrived.

On his return he seems to have been overwhelmed with commissions, almost every one in Vicenza and its neighbourhood, who could afford to build, employing him to design there a mansion or villa, of which class of subjects the majority of his works consist. Though he executed comparatively few structures of great magnitude and importance he had numerous opportunities for displaying his invention upon a moderate scale, and creating a style of domestic architecture till then almost unknown—which no doubt is one reason why he has so generally been taken as a model by architects of other countries.

Among the numerous private mansions erected or designed by him at Vicenza are the palazzi Tiene, Valmarana, Chiericati, Porti, Capitanio, Barbarano, &c., and the celebrated Villa Capra or Rotonda at a short distance from the city, besides a great many villas and country-seats along the Brenta. But some of the mansions at Vicenza have never been completed, and others too evidently attest either the poverty or the excessive negligence of their present possessors.

The reputation acquired by these and similar works led to Palladio's being invited to Venice, as Sansovino, the chief architect there, was growing infirm. He was at first employed with some alterations at the convent Della Carità, consisting of a Corinthian atrium, and a cloister beyond it. This atrium is merely an open court about 42 feet wide by 30 in depth, with a colonnade of four Corinthian columns on each side, and on each hand within these colonnades is the entrance to what were affectedly called *Tablini*, which were merely two tolerably spacious rooms, one intended for the sacristy, the other for a chapter-house. The atrium just mentioned communicates immediately, through a door facing the entrance, with the larger inner court or cloister, about 80 by 55 feet, whose elevations present three orders, viz. a Doric and Ionic with open arches between the columns (six on each of the longer, five on each of the shorter sides), forming open galleries quite around, while the Corinthian order above them has windows of rather small proportions. Two churches afterwards erected by him in the same city afforded him an opportunity of displaying his talents in buildings of that class. The first of these, San Giorgio Maggiore, was begun in 1556, though the façade was not erected till 1610. The plan consists of a nave with two aisles, but so short in proportion to the rest, there being only three arches on each side, that the whole approaches to the form of a Greek cross. Of decoration too there is very little besides columns and entablatures, and the small columns and pediments forming the altar tabernacles; even the vaulting and dome being quite plain, with merely arcs-doubleaux formed by the upper semicircular windows. The front has a large composite order of four three-quarter columns supporting a pediment, and placed on very lofty pedestals, with a small order in Corinthian pilasters on each side, surmounted by a half pediment, the horizontal cornice and rest of their entablature being continued as a fascia between the larger columns. Yet although there is no lack of decoration, the intercolumns, except the centre one (occupied by a lofty door, square-headed but with an arch over it), being filled by niches and pannels, and there being, besides, festoons between the composite capitals, the architecture itself is by no means rich; none of the mouldings are carved, and the modillions of the cornices are mere blocks. The same may be said of the still more celebrated church called Il Redentore, begun in 1578, about two years before the architect's death. In description the façade of this edifice agrees very nearly with that of the preceding, being similarly disposed, with a large composite order and a lesser Corinthian one, with half pediments. At the same time there are considerable differences, for instead of being raised upon pedestals, the larger order stands upon the platform of a flight of steps occupying the centre division of the front, and, instead of four three-quarter columns, consists of two half-columns and two pilasters. The proportions again are quite dissimilar, owing to the omission of pedestals, the greater width of the intercolumns, and the relative sizes of the two orders, the Corinthian one being here much larger than in the other instance, so that the cornice of its entablature is nearly level with the top of the shafts of the larger columns, whereas at S. Giorgio the smaller cornice is not higher than two-thirds of the larger columns. Neither is the lesser entablature here continued throughout, but its architrave alone, except in the centre intercolumn, where there are two Corinthian half-columns to the door, surmounted by an entablature and pediment, besides which there are smaller columns and segmental pediments to the niches in the lateral divisions of this centre compartment. All these different columns, pediments, and half-pediments tend to produce quite as much monotony as variety. In its plan this church greatly surpasses the other, having a good deal of play and elegance in its arrangement, and being more imposing in its proportions. Still here, again, the order itself constitutes the whole of the architecture; all the rest being bare and cold, and plain almost to nakedness.

The façade of San Francesco della Vigna was also designed by Palladio in 1562, although the church itself is said to be by Sansovino. This front is very much like that of S. Giorgio, except that instead of a large pannel there is a semicircular window (in three compartments, or of the kind called a Palladian window) over the doorway, also a circular sculptured ornament within the pediment, and an inscription on the frieze.

One of his last if not his very latest work was the Teatro Olimpico at Vicenza, which he did not live to complete; for he died August 6th, 1580, at the age of sixty-two, and that structure was not entirely finished till 1583. It has been extravagantly extolled by many, and severely condemned by others as a piece of puerile architectural pedantry. Speaking of Palladio's buildings at Vicenza, Woods says of it, 'it is too celebrated to be omitted, yet as far as my own taste is concerned it might have slept in oblivion. The *scene*, which is the part most admired, borders upon trumpery.'

It may indeed be asserted of Palladio's works generally that they have been greatly and indiscriminately overpraised by successive writers, who seem to have merely repeated one another. Among the many who have extolled Palladio's extraordinary merits, but without attempting to shew wherein they consist, are the names of Goethe, Quatremère de Quincy, Forsyth, Hope, and Beckford.

Judging Palladio dispassionately, it is impossible to deny that his works abound with defects and solecisms that would hardly be tolerated in any one else. We do not speak of engaged columns and matters of that sort belonging to the system itself, nor of the dryness and littleness of manner frequently resulting from an order being adapted only to a single floor of a building, one consequence of which practice is that notwithstanding so much stress is laid upon proportions, the due proportion that should be observed between the columns and the windows is almost lost sight of; but we speak of such positive errors as windows cutting into architraves, windows within friezes, doors lower than windows, figures on the raking cornices of window pediments, naked and dressed windows in the same composition, &c.; besides other faults which, if they do not run counter to rule, are yet sins against beauty and good taste, such as ugly balusters, mean attics, offensively wide intercolumns, heavy pediments, meagre entablatures and columns, particularly in the Ionic order, and above all a dryness, mannerism, and monotony of detail. As regards Palladio himself, there may be much excuse for his errors, but certainly none for the prejudices of those who would now insist upon our admiring his works without qualification, more particularly as nothing is easier than for a modern architect to avoid his faults, and even to improve upon his beauties.

PALLA'DIUM, a metal discovered by the late Dr. Wollaston in the grains of native platinum, in the year 1802; in these it exists to the amount of only about 1 per cent. He afterwards found it in the platinum sand of Brazil, in nearly pure grains of a divergingly fibrous texture, by which they are distinguishable from platinum. According to Breithaupt, the platiniferous sand of Siberia contains also grains of native palladium, which are flat and of a silver white colour. In the opinion of Levy, the primary form of these grains is a cube; their specific gravity varies from 11·8 to 12·14, and they contain very minute quantities of platinum and iridium. Their lustre is metallic, and their colour varies from silver white to steel grey; they scratch iron readily.

Palladium is usually obtained from the solution of the grains of platinum in aqua-regia, by the addition of cyanide of mercury after the greater part of the platinum has been separated by a salt of potash. [PLATINUM.] From the cyanide of palladium the metal is separated by a process which is tedious and rather complicated.

The properties of palladium are, that its colour is greyish white; it is very malleable and slightly elastic. Its density is 11·3 when fused, but 11·8 when rolled. It is almost as difficult of fusion as platinum. It is hard. It does not oxidize by exposure to the air.

Oxygen and Palladium have but little affinity for each other, and though palladium acquires a fine blue colour when exposed in the air to a strong heat, the oxidizement is so superficial, that no increase of weight can be ascertained. By the action of acids however, and especially of chlorine, it is converted into an oxide.

Protoxide of Palladium.—When carbonate of soda is added to a solution of the chloride or nitrate of palladium, brown hydrate of the protoxide is precipitated; and when this, after washing, is heated to redness, the water is expelled, and black oxide remains. When the nitrate is decomposed by heat, the same oxide is also procured; but if it be very strongly heated, it then loses oxygen; and it is not easily dissolved by acids after it has lost its water. It is composed of—

One equivalent of Oxygen .	8
One equivalent of Palladium .	54
Equivalent	62

Binoxide of Palladium is formed when a solution of potash is gradually poured on the double chloride of potassium and palladium in a dry state; by this is separated a compound of water, potash, and binoxide of palladium, which dissolves in an excess of the alkali; but the solution soon becomes gelatinous, and deposits a great part of the oxide combined with the potash. This, after washing with boiling water, abandons the greater portion of its water, and becomes black anhydrous binoxide of palladium; when strongly heated, it loses oxygen; it dissolves with difficulty in oxacids, and with dilute hydrochloric acid it yields chlorine. It is composed of—

Two equivalents of Oxygen .	16
One equivalent of Palladium .	54
Equivalent	70

Protochloride of Palladium is obtained by evaporating a solution of palladium in aqua-regia to dryness. It is a brown crystalline substance containing water, and becomes black when the water is dissipated. It is soluble in water, and when the dry salt is strongly heated, chlorine is expelled. It consists of—

One equivalent of Chlorine .	36
One equivalent of Palladium .	54
Equivalent	90

Bichloride of Palladium exists only in solution, and is procured by digesting the protochloride in aqua-regia; the solution has a very dark colour. With chloride of potassium it yields a double chloride of a red colour, whereas the protochloride yields a yellow double salt.

Carburet of Palladium is obtained by heating palladium foil in the flame of a spirit-lamp. This carburet is black and easily reducible.

Sulphuret of Palladium is of a greyish white colour and metallic lustre. It is fusible and is decomposable by heat. This compound is readily formed by heating its elements, with the evolution of light. When decomposed by heat, it yields a brownish powder, which appears to be a protosulphate of palladium, which is dissolved by hydrochloric acid, and when strongly heated is converted into metallic palladium. It consists of—

One equivalent of Sulphur .	16
One equivalent of Palladium .	54
Equivalent	70

Phosphuret of Palladium.—Phosphorus forms a fusible compound with palladium.

Alloys of Palladium.—This metal forms alloys, most of which are brittle, with arsenic, iron, bismuth, lead, tin, copper, silver, platinum, and gold; the alloy with nickel is ductile. A liquid amalgam is obtained by agitating it in a large quantity of mercury in a solution of palladium. But if the palladium precipitated by the mercury is in excess, a black metallic powder is obtained, formed of 48·7 parts of mercury and 51·3 of palladium: the mercury cannot be expelled from this compound, even at a white heat. Palladium, when fused with 6 parts of gold, destroys its colour; and this alloy was proposed by Dr. Wollaston for the graduated part of the mural circle of the Greenwich Observatory.

Salts of Palladium.—Nitrate of Palladium is obtained by treating it with nitric acid; the action takes place slowly unless assisted by heat, and the solution is of a red colour; by evaporation a red mass is procured, which is probably a subnitrate; the precipitate which it yields on the addition of cyanide of mercury is a fulminating compound.

Sulphate of Palladium is formed by dissolving the metal in sulphuric acid, or by decomposing the nitrate with it. It is a red soluble salt which is but little known.

Palladium has, of all metals, the greatest affinity for cyanogen, and the cyanide of mercury precipitates it from all its solutions, which gives an easy method of separating it from other metals; when the cyanide of palladium is heated, it is decomposed, and the palladium remains in its metallic state.

Most of the salts of palladium are soluble; those which contain the binoxide are little known; those of the protoxide are red or yellowish brown, and their solutions are of an intense yellowish red. Potash precipitates protohydrate of an orange colour, and sulphuretted hydrogen precipitates them of a deep brown. The protosulphate of iron and the metals which precipitate platinum throw down palladium in the metallic form. Ferrocyanide of potassium forms a yellow precipitate in the solutions of palladium, which is a cyanuret of iron and palladium; the cyanide of mercury precipitates a colourless cyanide of palladium. Protochloride of tin renders the solutions of palladium opaque, and gives a brown precipitate; but when they are sufficiently dilute, the colour becomes of a fine emerald green.

PALLA'DIUS, one of the Christian fathers, was bishop of Helenopolis in Bithynia, and author of a Greek work containing the lives of certain persons in Palestine and Egypt who made themselves remarkable at the time when he wrote by their religious austerities. This work was called the 'Lausiac History,' from Lausus, an officer in the imperial court at Constantinople, to whom it was dedicated. It is published in the *Bib. Pat. Morell.*, Par., 1644.

According to Cave, Palladius wrote his history about 421, in the fifty-third year of his age. We know nothing more of him, except that he was an Origenist and an admirer of Rufinus. He speaks very strongly against Jerome.

There was another writer of the same name, who composed a 'Dialogue of the Life of St. Chrysostom,' at Rome, in the year 408. It is not known whether he is the same or a different person from the former. Du Pin thinks him the same; Tillemont and Fabricius take him to be another person. His 'Dialogue' is published in the best editions of Chrysostom's works.

(Cave, *Hist. Lit.*, i., p. 376; Du Pin, *Bib. des Aut. Ecc.*; Lardner's *Works*, vol. iv., p. 410-11, and v., p. 6, ed. of 1831.)

PALLA'DIUS (Παλλάδιος), generally surnamed 'Sophista,' or 'Iatrosophista,' the author of three Greek medical works still extant. Nothing is known of the events of his life, but he is supposed to have gained his title of *ἰατροσοφιστής* by having been a professor of medicine at Alexandria. His age is also very uncertain: but as he quotes Galen (*De Febrib.*, pp. 6, 8, 12, 56, ed. Bernard), and he is himself several times mentioned by Rases, we may safely place him somewhere between the beginning of the third and the end of the ninth century A.D. Freind, in his 'Hist. of Physic,' argues that he must have lived after Aëtius, because the chapter 'De Epiala,' in his treatise 'De Febribus,' is taken word for word from that author; but this argument is by no means conclusive, because (as Bernard remarks in his preface) almost the very same words are to be found in Galen (*De Different. Febr.*, lib. ii., cap. 6), from whom therefore it is probable that both authors borrowed the passages in question. The first of his extant works is entitled *Περὶ πυρετῶν σύντομος σύνοψις*, 'De Febribus concisa Synopsis.' It consists of thirty chapters, and contains an account of the different kinds of fever (cap. 4, &c.), its causes (cap. 9), and its symptoms (cap. 10): it then treats separately of the different kinds of fever (cap. 14-18), and especially of the intermittent (cap. 19-23); and finally, in one short chapter, of the treatment (cap. 29). The treatise is too short to be of much value, and almost the whole of it is to be found in Galen, Aëtius, and Alexander Trallianus. It was first edited by Chartier, 4to., Gr. and Lat., Paris, 1646; the last and best edition is by J. St. Bernard, 8vo., Gr. and Lat., Lugd. Bat., 1745. It deserves to be noticed that though there are several MSS. of this treatise in different public libraries, not one of them bears the name of Palladius; but in some it is ascribed to Stephanus, in some to Theophilus, and in others to both. It is however, in the opinion of Freind (*Hist. of Physic*) and Bernard (*Præfat.*), clearly ascertained to be the work of Palladius, as he refers to it in another of his works entitled 'Εἰς ἕκτον τῶν Ἐπιδημιῶν Σχόλιον,' 'In Sextum (Hippocr.) Epidemiorum Librum Commentarius' (sect. 4, 9). This work is imperfect, and goes no farther than the seventh section, with a few fragments of the eighth. In it (says Freind) he, with great perspicuity and exactness, illustrates not only Hippocrates, but also several passages of Galen; and observes particularly that the stone increased much in his time, and was less curable; and this he imputes to the luxury of the age, to much eating, and want of exercise (sect. 1, 6, p. 19, ed. Dietz). It was first translated into Latin by J. P. Crassus, and published after his death, Basil. 1581, 4to., in the collection called 'Medici Antiqui Graeci,' &c. The Greek text has lately been published for the first time by F. R. Dietz, in his 'Scholia in Hippocratem et Galenum,' &c., 2 vols. 8vo., Regim. Pruss., 1834. The third work by Palladius is entitled Σχόλια εἰς τὸ περὶ ἀγμῶν Ἱπποκράτους, 'Scholia in Librum Hippocratis de Fracturis.' This also is imperfect, but, in Freind's opinion, what remains is enough to let us see that we have no great loss by it, the text being as full and as instructive as the annotations. They were translated into Latin by Jac. Santalbinus, and are inserted, Gr. and Lat., in the edition of Hippocrates by A. Foesius, Francof. 1595, fol., sect. vi., pp. 196-217; and in that of Hippocrates and Galen by Chartier, tom. xii., pp. 276-288. Dietz, in his preface, mentions another work by Palladius which he found in MS. in the library at Florence, consisting of scholia on Galen's work 'De Sectis,' which he intended to publish, but found the MS. so corrupt, that he was obliged to give it up. Palladius appears to have been well known to the Arabians, as, besides being quoted by Rhazes, he is mentioned among other commentators on Hippocrates by the unknown author of 'Philosoph. Biblioth.,' quoted in Casiri, 'Biblioth. Arabico-Hisp. Escurial.,' t. i., p. 237.

PALLANZA. [NOVARA, VALLE DI.]

PALLAS, the second in order of discovery, and the farthest from the sun, of the new planets. Its motion (for it may have been previously seen and taken for a star) was first observed by M. Olbers of Bremen, March 28, 1802, in making some observations of the stars of Virgo, with a view to future observation of what was then the only new planet, Ceres. The following extract from the Report on Astronomy, made to the British Association by Mr. Airy, will trace the connection of this discovery with those which succeeded it. "One curious consideration was suggested by the comparison of the two orbits (of Ceres and Pallas). Their major axes were so nearly equal (the order of magnitude being sometimes changed by the perturbations of Jupiter), and their orbits approached so near at the intersection of their two planes, that Olbers started the hypothesis of their having been originally parts of a larger planet. If this were true it seemed probable that there might be other parts, and if these were describing orbits round the sun, the intersection of their planes must fall nearly at the same point. By examining the parts of the heavens corresponding to the two intersections, such planets must infallibly be found. On this principle the German astronomers proceeded in a systematic look out for new planets. Olbers in particular examined once in every month a certain portion of the heavens. In September, 1804, Harding discovered Juno, and in March, 1807, after a monthly examination during three years, Olbers discovered Vesta. No others have been found, though the same system of examination was long kept up. In Lindenau's *Zeitschrift*, vol. i., is a notification by Olbers, that he had examined the same parts of the heavens with such regularity that he was certain no new planet had passed between 1808 and 1816. Nothing can give a more forcible idea of the perseverance which led to these discoveries."

The size of Pallas has not been measured with certainty, but it is known to be exceedingly small. On account of its very great inclination to the ecliptic, and eccentricity, it is among the least known of the planets as to the theory of its motion. The elements of its orbit are as follows:

Elements of Pallas's Orbit.

Epoch 1839, October, 14d. 0h. mean astronomical time at Berlin.

Semi-axis major 2·77293, that of the earth being assumed as the unit.

Eccentricity ·24082.

Inclination of the orbit to the ecliptic 34° 37' 28·7''.

Long. of ascending node	172° 39' 31·2''	From the mean equinox of the epoch.
Long. of perihelion	121° 7' 6·8''	
Mean Longitude .	33° 50' 50·2''	

Mean daily sidereal motion 769''·6426.

PALLAS, PETER SIMON, was the son of a surgeon at Berlin, where he was born on the 22nd of September, 1741. He was brought up to the medical profession, and instructed in the natural and medical sciences, in which he made rapid progress. He had also a great talent for learning languages, which he found of advantage to him in after-life. While very young, he imbibed a taste for zoology, and to this science (which became the sole occupation of his future years) he devoted all his leisure while a boy. In 1758 he went to the university of Halle, and he afterwards visited those of Göttingen and Leyden. At Leyden he took his doctor's degree, on which occasion he wrote an inaugural dissertation on intestinal worms. Zoology had now become his ruling passion, and he employed almost all his time in visiting the different museums of natural history, for which Leyden was at that time particularly celebrated. In July, 1761, he came to London for the avowed object of studying medicine, but in reality for the purpose of examining the different collections of animals in this country, and making himself acquainted with the natural productions. He remained in London nearly a twelvemonth. In 1763 he obtained his father's permission to settle at the Hague, where, in 1766, he published his 'Elenchus Zoophytorum,' a work evincing great talent, and which acquired him considerable reputation. The 'Miscellanea Zoologica,' which appeared the same year, further increased the fame of Pallas, and he had appointments offered him by several foreign governments. Among others he attracted the notice of the Empress Catherine, who invited him to St. Petersburg, and offered him the professorship of natural history in the Imperial Academy of Sciences, which he accepted in 1767.

At the time of his arrival in Russia, an expedition, composed of a number of astronomers and other scientific men, was on the eve of setting out, by command of the empress, for the purpose of observing the transit of Venus, and of investigating the natural history and geography of Siberia and the other northern parts of the Russian empire. Pallas gladly accepted an invitation to accompany the expedition, and employed the winter previous to his departure in making the necessary preparations. During this interval he found time however to continue his literary labours, and prepared several numbers of the 'Spicilegia Zoologica' for publication, a work which he had commenced previous to going to St. Petersburg. He also presented his first celebrated memoir to the Academy on the fossil bones of great quadrupeds, which have been so abundantly met with in Siberia. He showed that these bones must be referred to different species of elephant and rhinoceros, and other animals now inhabiting tropical countries.

The expedition set off in June, 1768. The first summer was spent in traversing the plains of European Russia, and the winter was passed at Simbirsk, on the Volga. The next year the expedition visited the borders of Calmuck Tartary, when Pallas carefully examined the shores of the Caspian Sea. They afterwards proceeded through Orenburg, and passed the next winter at Ufa. In 1770 Pallas crossed the Uralian Mountains to Catharinenburg, and, after examining the mines in that neighbourhood, he proceeded to Tobolsk, the capital of Siberia. The year following the expedition reached the Altai Mountains, which run from east to west, forming the southern boundary of Siberia, and, by forming a barrier which obstructs the course of the southerly winds, renders Siberia much colder than many countries in the same degrees of latitude. Thence they proceeded to Krasnoyarsk, on the Yenesei, where they passed the winter; and here they observed the *freezing of mercury*, in 56½° N. lat. The next spring Pallas penetrated across the mountains to the frontiers of China, whence he retraced his steps, and slowly proceeded homewards, visiting Astracan and the neighbourhood of Mount Caucasus on the way back. He reached St. Petersburg in July, 1774, having been absent six years.

Pallas, who was a young and vigorous man when he set out, returned broken down in health, and with his hair whitened from fatigue and disease. Almost all his companions had died; and instead of enjoying the rest which he so much needed, he was obliged to redouble his activity.

in order to arrange their notes and observations as well as his own. The journal which he had kept of his travels, and which he occupied his time in arranging while the expedition was detained in winter-quarters, had been regularly transmitted each year to St. Petersburg, and published on its arrival.

On his return to St. Petersburg, he received many marks of favour from the Empress Catherine. She decorated him with titles, and gave him several lucrative appointments. The office of instructing the grand-dukes Alexander (afterwards emperor) and Constantine in the natural and physical sciences was also entrusted to him. After remaining many years at St. Petersburg, quietly engaged in the pursuits of literature and science, in 1793 and 1794 he took advantage of the conquest of the Crimea to travel through the southern provinces of Russia. He was so much delighted with the climate and productions of the Crimea, that he asked permission of the empress to settle there, hoping to recruit his health. The empress acceded to his request in the most generous manner, giving him a handsome establishment, and a liberal salary to support it. He went to live in the Crimea in 1795, but found that he had been greatly deceived in the climate, which is very variable and sickly. The inhabitants are also barbarous, and he was deprived of all society. His existence was thus rendered very uncomfortable. He lived here however fifteen years, occupied in his researches in natural history. At last he sold his property and quitted Russia. Pallas arrived at Berlin in 1810, after forty-two years of absence: he survived his return a short period only, dying on the 7th September, 1811, at the age of seventy.

Any analysis of the works of Pallas is impossible, for he spent his whole life in the accumulation of facts, which he always related in the simplest manner, leaving the easy task of drawing deductions from them to others. All his writings, of which he left a prodigious number, though written in a dry and uninteresting style, are full of novelties and truths: 'they have placed,' says Cuvier, 'the name of their author in the first rank of naturalists, who are constantly referring to and quoting from every page of them. They are also read and consulted with equal interest by the historian, the geographer, and the student of languages or of nations.' The following is a brief notice of his principal works:—

'Elenchus Zoophytorum,' the Hague, 1766, 8vo.; 'Miscellanea Zoologica,' 4to. Both these works appeared the same year, and were interesting from containing a great deal of information on those little known classes of animals which had been confounded under the name of worms. Pallas showed that the presence or absence of a shell should not form the primary basis of their distribution, but that the analogies of their internal structure ought to be consulted. The 'Elenchus,' which is principally confined to sponges, corallines, &c., is remarkable for the clearness of the descriptions and the care bestowed on the synonyms. The 'Miscellanea' was partly reprinted, with many additions (but with the omission of some of the most valuable parts relating to the invertebrate animals), in the 'Spicilegia Zoologica,' the first four numbers of which were published at Berlin, in 1767.

'Travels through different Provinces of the Russian Empire,' published in German, St. Petersb., 1771-76, 3 vols. 4to. This work contains a great deal of valuable information, but is imperfect, from having been hastily compiled, without access to books of reference, during the author's travels. After Pallas returned to St. Petersburg from his first expedition, he published several interesting papers descriptive of the new and rare quadrupeds which he had met with in Siberia. His account of the musk, the glutton, the gibelline, and the polar bear may be particularly mentioned, which form the four last parts of the 'Spicilegia Zoologica,' and are exceedingly well written. He published a separate volume on the different species of Rodentia that he discovered; it is entitled 'Novæ Species Quadrupedum ex Glirium Ordine,' Erlang., 1778, 4to. The anatomy and history of these animals are excellently described in this work, which is altogether one of his best.

Pallas became a botanist during his travels, and undertook, by desire of the empress, a 'Flora Rossica,' illustrated with magnificent plates, two volumes of which were published at St. Petersburg, in fol., 1784-85; no more appeared.

The last great work which he wrote was a Fauna of the Russian empire, which he intended to embrace all the animals found both in European and Asiatic Russia. He worked at it till his death, and completed the manuscript of the vertebrate animals, which was printed in 3 vols. 4to. at St. Petersburg, in 1811, under the name of 'Zoographia Rosso-Asiatica;' but it was never published till 1831, in consequence of the plates having been mislaid. Some naturalists however managed to obtain copies of the text.

Pallas may be said to have laid the foundation of modern geology in a memoir containing 'Observations on the Formation of Mountains,' which was read to the Academy of St. Petersburg, in 1777, before Gustavus III. of Sweden. 'An attentive consideration of the great mountainous chains of Siberia led Pallas to the discovery of the general law which has since been completely verified, of the succession of the three primitive orders of rocks, the *granitic* in the centre, the *schistous* on their sides, and the *calcareous* externally.'[*] Pallas rendered further service to geology by his second memoir upon the fossil bones of Siberia, published in the 'Novi Commentarii Acad. Petr.' He here related (what was at that time considered as an incredible circumstance) the fact of having found the body of a rhinoceros entire, with the skin and flesh on, imbedded in the frozen ground. The probability and truth of this observation are placed beyond all doubt by the well-known subsequent discovery of the body of an elephant in a mass of ice on the coast of Siberia. [ELEPHANT, *Fossil Species.*]

Pallas wrote a 'History of the Mongolian Nations,' 2 vols. 4to., in German, Petersb., 1776-1801, which is perhaps the most classical account that was ever written of any race of people. He not only treats of the origin and physical character of these people (all usually denominated Tartars), of their manners and government, but also of their religion and languages.

Pallas undertook, by command of the empress, a 'Comparative Vocabulary' of all the languages of the world, two volumes of which were published at St. Petersburg in 1787-1789, in 4to. They contain two hundred and eighty-six words in two hundred languages of Asia and Europe. A third volume, which never appeared, was intended to embrace the languages of Africa and America. The plan of this work (suggested by the empress) was bad, for a simple vocabulary can never give any idea of the mechanism and spirit of a language; it is however of considerable value.

Besides the works already mentioned, Pallas published, among many others, 'Travels through the Southern Provinces of the Russian Empire, in the years 1793 and 1794,' Leipzig, 1801, 2 vols. 4to., in German. There is an English translation of this work, and also of a memoir by Pallas on the different kinds of sheep found in the Russian dominions and among the Tartar hordes of Russia. The latter was translated by James Anderson, the agriculturist.

Pallas was a member of the Royal Society of London, of the Institute of France, and of several other foreign academies, besides that of St. Petersburg; and he wrote many memoirs, which will be found in their different Transactions.

(*Eloge Historique*, by Cuvier; *Biographical Essay on M. Pallas, read to the Academy of Berlin*, by M. Rudolphi, 30th January, 1812.)

PALLAVICINO, SFORZA, son of the marquis Alessandro Pallavicino of Parma, was born at Rome in 1607, studied in the Roman College, and afterwards entered the order of the Jesuits. He wrote a philosophical treatise, 'Del Bene' (on happiness), and another treatise, 'Dello Stilo' (on style in written composition), both of which are esteemed. But the work for which he is best known is the 'History of the Council of Trent' (Istoria del Concilio di Trento, 3 vols., 4to., Rome, 1664), written in defence of the see of Rome against the charges and insinuations brought against it by the celebrated Father Sarpi in his history of the same council. Both works ought to be consulted and compared, in order to form a just opinion of the important transactions to which they refer. Pope Alexander VII. made Pallavicino a cardinal, and employed him in important affairs. His last work was on Christian perfection, 'Arte della Perfezione Cristiana.' Cardinal Pallavicino died in 166

PALLAVICI'NO, FERRANTE, born at Parma in 1615, entered at an early age the order of the Canons of St. Augustin, and made his vows, but after a few years he found that he had acted rashly, and that he was totally unsuited for the life which he had embraced. Having obtained his superior's permission to travel, he repaired to Venice, where he led a life of licentiousness, and wrote obscene books, which found a ready sale. He afterwards went to Germany as chaplain to a nobleman, and returned to Venice just at the time when war broke out between Edoardo Farnese, duke of Parma, and Pope Urban VIII., on the subject of the duchy of Castro. [Farnese.] Pallavicino wrote in favour of his sovereign the duke, using violent expressions against the pope and his nephews the Barberini. One of his pamphlets was entitled 'Il Divorzio Celeste,' by which he intimated that a divorce had taken place between the church and its Divine founder. Pallavicino now thinking he was no longer safe in Italy, resolved to go to France, but unfortunately for him he was accompanied by a young Frenchman of insinuating address, who proved to be a spy of the Barberini, and who led him unawares into the Papal territory of Avignon, where he was immediately seized and led to prison. He was tried for apostasy and high-treason, and was condemned and beheaded on the 5th of March, 1644, at the early age of 28 years. (Poggiali, *Memorie per la Storia Letteraria di Piacenza.*)

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[*] Cuvier.

PALLE'NE. [Macedonia.]

PALLIAL IMPRESSION. This term is used by conchologists to denote the mark formed in a bivalve shell by the *Pallium* or mantle. It is, normally, found near the margin of the shell, and is, thence, sometimes called the *marginal impression*. In the *Dimyaria*, or bivalves which have two impressions of muscles of attachment, this mark passes from one of those impressions to the other; and if in its passage it bends inwards posteriorly, it is said to be *sinuated*, and the part where this occurs is the *siphonal scar* of Mr. Gray.

PALLIOBRANCHIA'TA, M. de Blainville's name for his first order of his class (the 3rd of the *Malacozoa*) *Acephalophora*.

The following is his definition of the order:—

Branchiæ applied to the internal surface of the lobes of the mantle.

Mouth provided with a pair of long ciliated appendages which are extensible beyond the borders of the mantle, and simulate a kind of arms; termination of the intestinal canal anterior.

Body more or less compressed, comprised between the two pieces of a bivalve shell, one superior, the other inferior, opening anteriorly and articulating posteriorly.

Section I.

Shell symmetrical.

Genera.—*Lingula*; *Terebratula* with its various subsections; *Thecidea*; *Strophomena*; *Plagiostoma*; *Dianchora*; and *Podopsis*.

Section II.

Shell not symmetrical, irregular, constantly adherent.

Genera.—*Orbicula* and *Crania*. [Brachiopoda.]

PALLIUM. [Pall.]

PA'LLIUM (Malacology). [Pallial Impression.]

PALM. [Weights and Measures.]

PALM-OIL. In the article Elæis the Palm has been described, which is the source of the fatty substance commonly known by the name of Palm-oil, and which is imported from the west coast of Africa in considerable quantities. In the year 1833, no less than 220,329 cwts. paid a duty of 27,541*l.*, at the rate of 2*s.* 6*d.* per cwt. Its price has varied from 32*l.* to 24*l.* (duty paid) per ton. In 1839 as much as 272,991 cwts. paid the duty (at 1*s.* 3*d.*), producing 17,062*l.* It has a solid consistence and an orange-yellow colour, and consists of 31 parts of stearin and 69 of elain, besides the principles which give it colour and odour. It is emollient, and is sometimes used in medicine, and also as a liniment in sprains and bruises. It is also employed in the manufacture of soap. The Edinburgh Pharmacopœia mentions Cocos butyracea as the source of Palm-oil, but this is imported from South America, of which part of the world that Palm is a native.

PALM-SUNDAY, the Sunday before Easter, so named because on that day boughs of palm-trees used to be carried in procession, in imitation of those which the Jews strewed in our Saviour's way when he went up to Jerusalem. It is still customary with our boys, in most parts of England, to go out and gather slips with the willow flowers or blossoms at this time; these are selected as representatives of the palm, because they are generally the only plants, at this season, [illegible], in which the power of vegetation can be discovered. Barnaby Googe, in his 'Popish Kingdome,' 4to., Lond., 1570 (a translation from Naogeorgus), alludes to the use of willow branches, at that time, instead of palm.

Stowe, in his 'Survey of London,' tells us that 'in the week before Easter had ye great shewes made for the fetching in of a *twisted tree, or with*, as they termed it, out of the woods into the king's house, and the like into every man's house of honour or worship.' This must also have been a substitute for the palm. An instance of the remote antiquity of this practice in England is afforded by the 'Domesday Survey,' under Shropshire, vol. i., p. 252, 'Terra dimid. vir. Unus reddit inde *fascem buxi in Die Palmarum*.'

The ceremony of bearing palms on Palm-Sunday was retained in England after many other ceremonies were dropped, and was one of those which Henry VIII., in 1539, declared were not to be contemned or cast away. (*Proclam. 26 Feb., 30 Hen. VIII.*) They were borne till 2 Edw. VI. (Stowe's *Chron.*, an. 1548.) These boughs or branches of palm, whatever they might be, underwent a regular blessing. (See the *Missale ad Usum Ecclesiæ Sarisburiensis*, 4to., London, 1555.) Fuller's 'Church History,' p. 222, says, 'Bearing of palms on Palm-Sunday is in memory of the receiving of Christ into Hierusalem a little before his death, and that we may have the same desire to receive him into our hearts.'

The Russians of the Greek church have a very solemn procession on Palm-Sunday.

PALM TREE. [Palms.]

PALMA, GIA'COPO, called the Old, to distinguish him from his great-nephew of the same name, was born at Serinalta, in the territory of Bergamo (though Vasari says at Venice), and is said to have been a disciple of Titian. The dates both of his birth and death are not precisely fixed. Vasari says he died at the age of 48. He had always been considered to be a companion and rival of Lotto, who was born in 1513, till La Combe, on the faith of an apocryphal anecdote of his having finished a picture left imperfect by Titian, who died in 1576, and by other dates, fixes his birth in 1540 and his death in 1588, at the age of 48, as stated by Vasari. But La Combe forgot that Vasari, in his work published in 1568, says that Palma died at Venice, several years before. Palma's manner has much resemblance to that of Titian, whom he chiefly imitated in the softness, as he did Giorgione in the brightness of his colouring, the warm golden tone of which is extremely pleasing. It appears that he had a peculiar manner of laying on his colours, by which he gave the appearance of high finishing without labour.

The paintings of Palma are highly esteemed (though some writers deny him originality) for the noble taste of his composition, for natural and pleasing expression, and the harmony of his colours.

Vasari speaks with high commendation of a picture by Palma representing the ship in which the body of St. Mark was brought from Alexandria to Venice, exposed to the fury of a frightful storm. Other celebrated paintings of his are, a Santa Barbara at Venice, and a St. Jerome in the Zampieri palace at Bologna. The galleries of Vienna, Munich, and Berlin possess several of his works, and there are some in England; among them are a few which are ascribed to Giorgione, but, in the opinion of Dr. Waagen, they are by Old Palma. (Fuseli.)

PALMA GIACOPO, called the Young, was born at Venice in 1544, a date which is alone sufficient to shew the error of La Combe in placing the birth of Old Palma in 1540, as he would then have been only four years older than his great-nephew. Young Palma soon left the style of Antonio his father, an indifferent master, to study the works of Titian, and more especially those of Tintoretto. At the age of fifteen he was taken under the protection of the duke of Urbino, and maintained for eight years at Rome, where, by copying the antique, Michael Angelo, Raphael, and Polidoro, he acquired correctness, style, and effect, which he endeavoured to embody in the first works which he produced after his return to Venice. Some persons conceive that these works combine the best principles of the Roman and Venetian schools. They are executed with a degree of facility, which was the great talent of this master. He did not however succeed in obtaining adequate employment; honour and emolument were engrossed by Tintoretto and Paul Veronese; and he owed the advantage of being considered the third in rank to the patronage of Vittoria, a fashionable architect and sculptor, through whose recommendation he was overwhelmed with commissions, which had the unhappy effect of relaxing his diligence. On the death of his former competitors, when he found himself without a rival, his carelessness increased, and his pictures were little more than sketches: yet when time and price were left to his discretion, he produced works worthy of his former fame, rich in composition, full of beauty, variety, and expression. His tints, fresh, sweet, and transparent, less gay than those of Veronese, but livelier than those of Tintoretto, though slightly laid on, still preserve their bloom. In variety of expression he is not much inferior to either of those masters, and his Plague of the Serpents at St. Bartolomeo may vie with the same subject by Tintoretto in the school of St. Rocco. It is surprising that a man from whom the depravation of style at Venice may be dated, should still have so many charms to attract the eye and interest the heart. Palma died in 1628, aged 84 years. (Fuseli.)

PALMA. [CANARIES.]

PALMA. [MALLORCA.]

PALMA CHRISTI. [RICINUS.]

PALMA NOVA. [UDINE, PROVINCE OF.]

PALMI. [CALABRIA.]

PALMIC ACID. When palmin is treated with solution of potash, it is saponified, and glycerine is separated. When this soap is dissolved in water, and hydrochloric acid is added to it, it is decomposed, and the palmic acid separates.

The properties of this acid are, that when pure it fuses at 122°; the crystals are acicular and colourless; it dissolves in all proportions in alcohol and æther: it reddens litmus paper strongly, and combines with bases to form salts, which are called *palmates*.

Palmate of ammonia is an uncrystallizable salt, and so also is the palmate of soda. Palmate of magnesia is dissolved by alcohol when hot; and as the solution cools, crystalline scales of the salt are deposited. Palmate of lime is soluble also in hot alcohol. Palmate of copper is of a fine green colour; palmate of lead may be obtained in fine silky needles: that of silver is insoluble in alcohol or water.

PALMIN is obtained from castor-oil by treatment with nitric acid containing a portion of nitrous acid. The oil becomes in a few hours of a yellow colour, and is rendered solid; the yellow colour is accidental, pure palmin being white: it is very soluble in alcohol and in æther; it melts at about 150° Fahr. When it has been dissolved in boiling alcohol, it is deposited in small opaline grains as the solution cools.

PALMI'NA, Mr. Gray's name for a genus of Cirrhipedes, differing from *Otion* in having but one auricle.

PALMI'PEDES, Cuvier's name for his sixth order of birds, and thus defined by him:—

Feet formed for natation, that is to say, implanted in the posterior part of the body, articulated to short and compressed tarsi, and palmated or webbed between the toes, are their characteristic. A close-set lustrous plumage saturated with an oily juice, and furnished near the skin with a thick down, defends them from the water on which they live. They are the only birds which have the neck exceeding, sometimes greatly, the length of the feet, a provision accorded to them because, swimming as they do at the surface, they have often to search in the depth below. Their sternum is very long, guarding well the greater part of their viscera, and only having on each side a notch or an oval hole furnished with membranes. Their stomach is generally a muscular gizzard, the cœca are long, and the lower larynx simple, but tumid with cartilaginous capsules in one family.

Cuvier divides his *Palmipedes* into four families. *The Divers* (*Brachypteræ*); the *Longipennes* or *Grands* [illegible]*liers* (Albatrosses, &c.); the *Totipalmes* (Pelicans, &c.); and the *Lamellirostres* (Swans, Geese, Ducks, &c.).

PALMI'PORA, a genus of MADREPORÆA.

PALMS are woody plants, usually trees, with simple stems, inhabiting the warmer parts of the world and especially tropical countries. They constitute a natural order of Endogens most important on account of the many uses to which the species or their products are applied, but in reality nearly allied to the Liliaceous and Juncaceous or Rushy plants of northern countries. Linnæus, who had scarcely any means of judging of the real structure of their fructification, and was therefore uncertain where to station them in his sexual system, placed them in an Appendix by themselves and called them the Princes of Vegetation; it has now however been ascertained that they chiefly belong exandria, Monœcia, and Diœcia.

In general they adhere to the soil by clusters of strong simple roots which not uncommonly form a hillock elevated above the surface of the ground. Their trunks are solid, harder on the outside than the centre, and are sometimes, as in the cane-palms, coated by a layer of siliceous matter; they are usually quite simple, growing exclusively by a single terminal bud, called in the Areca its cabbage, and eaten as a delicacy when boiled; but in the Doom Palm, or Hyphæne, they are regularly forked. In the majority of the order the stem is nearly cylindrical, but in some it is thickest at the base, and in others swollen in the middle; occasionally it is defended by strong hard spines, but is more frequently unarmed, and marked by rings which indicate the places whence the leaves fall off.

The leaves, called fronds by Linnæus, are alternate, with a very hard epidermis, and a distinct petiole, from the base of which a coarse network, called the reticulum, sometimes separates next the trunk; they are usually either pinnated or fan-shaped, but are occasionally nearly split in two; their veins are parallel, the spaces between them plaited, and the whole size sometimes very great, as in the fan-palm, in which specimens have been seen as much as 18 or 20 feet in breadth. [CORYPHA.]

The flowers appear in panicled spikes from the inside of hard dry spathes, which are often boat-shaped, and although small, they are sometimes so extremely numerous that each panicle will weigh many pounds. They are generally hermaphrodite, but often monœcious, diœcious, or polygamous. The calyx and corolla consist each of three pieces, which are either distinct or more or less united. The stamens vary in number, from 3 to a large multiple of that number, and bear 2-celled linear anthers which open along their inner face. The ovary consists of 3 carpels, which are sometimes distinct, sometimes consolidated, and occasionally in part abortive, so that the ovary is only one-celled. The ovaries are almost always solitary, and erect in each cell, but sometimes two are present, which in that case stand side by side; they are orthotropous in some genera and anatropous in others. The styles are very short, the stigmas simple.

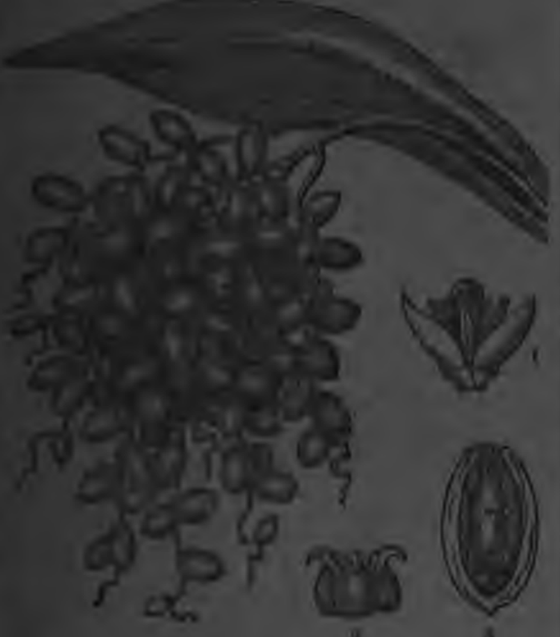
The fruit varies extremely in its consistence and appearance. Sometimes it is 3-celled, often one-celled; in such species as the Cocoa-nut it is a kind of drupe covered by a course fibrous rind; in others it is a soft sweet eatable pericarp, as in the date; in others its surface is broken up into lozenge-shaped spaces, as in the Sagus, whose fruit looks as if covered with scale-armour. The seed is single, either solid or hollow, and consists principally of albumen of a fleshy, oily, horny, or cartilaginous texture, within which is lodged a very small cylindrical embryo at some part of the surface distant from the hilum.

That palms were among the first land-plants which were created, is proved by the numerous remains of their fruit and leaves which occur in the coal formations; and remains of them are occasionally met with through all the more recent fresh-water rocks. They appear to prefer a soil in some measure salt, although many species are inhabitants altogether of inland districts and even of high mountains. Their geographical limits appear to be within 36° N. lat. in America, 44° N. lat. in Europe, 34° N. lat in Asia, and 38° S. lat. in the southern hemisphere; and, according to Von Martius, their powers of migration are extremely small; none of them have been able to cross the ocean without the aid of man. Their favourite stations are said to be the banks of rivers and watercourses, and the sea-shore, some species scattered singly and others collected together into large forests.

There is scarcely a species of this order in which some useful property is not found. The cocoa-nut, the date, and others are valued for their fruit; the fan-palm and many more, for their foliage, whose hardness and durability renders it an excellent material for thatching; the sweet juice of the palmyra [BORASSUS] when fermented yields wine; the centre of the Sago-palm abounds in nutritive starch; the trunk of the Iriartea or Ceroxylon exudes a valuable vegetable wax; oil is expressed in abundance from the oil-palm; an astringent matter resembling dragon's blood is produced by Calamus Draco; many of the species contain within their leaves so hard a kind of fibrous matter, that it is employed instead of needles, or so tough that it is manufactured into cordage; and finally, their trunks are in some cases valued for their strength and used as timber, or for their elasticity, or their flexibility, as in the cane-palm.

The number of species is estimated at about 1000, divided into 61 genera distributed through 5 tribes.

(Martius, *Palmarum Familia ejusque Genera denuò illustrata*; also the *Genera and Species Palmarum* of the same author; Endlicher's *Genera Plantarum*, p. 244; and Lindley's *Natural System of Botany*, ed. 2, p. 343.)



A. Branch of fruit of the Phœnix Dactylifera, or Date-Palm, with the spathe from which they sprang. 1. A separate flower. 2. The ovary. 3. A section of the fruit, containing a horny seed, in the middle of whose back is seen a pit, which conceals the seat of the embryo.

PALMELLA'RIA, a genus of Polyparia Membranacea.

PALMYRA, TADMOR. Both these names are derived from the palm-trees which once grew in the neighbourhood of this ancient city. Palmyra is situated in an oasis of the Syrian desert, nearly half-way between the Orontes and the Euphrates, and about 140 miles east-north-east of Damascus, in 34° 24′ N. lat. and 38° 20′ E. long., according to Major Rennell. (*Comparative Geography of Western Asia.*)

The circumstance of Palmyra being situated in an oasis sheltered by hills to the west and north-west, and supplied with wholesome water, and on a line leading from the coast of Syria to the regions of Mesopotamia, Persia, and India, must have pointed it out in very early times to the caravans as a convenient halting-place in the midst of the desert. The Phœnicians were probably early acquainted with it, and may have suggested to Solomon, with whom the king of Tyre was in alliance, the idea of establishing an emporium there. We read in the Second Book of *Chronicles* (viii. 4), that Solomon "built Tadmor in the wilderness, and all the store cities which he built in Hamath." Hamath was a town and territory extending along the banks of the Orontes, and bordering on the Syrian desert. After this we read no more of Tadmor in the Scriptures, but John of Antioch, probably from some tradition, says that it was destroyed by Nebuchadnezzar. The first notice which we have of it in Roman history is that M. Antony, being in Syria, marched to plunder it, expecting a rich booty, but the inhabitants disappointed him by transporting their goods beyond the Euphrates.

In the time of Pliny it was the intermediate emporium of the trade with the East, a city of merchants and factors, connected with the Parthians on one hand and the Romans on the other. The produce of India found its way to the Roman world through Palmyra. It afterwards became subject to the empire as a free state, and was greatly favoured by Hadrian and the Antonines, under whom it attained its greatest splendour.

Odenatus, a native of Palmyra, having rendered great services to the Roman empire in a war against the Persians, received, with the consent of Gallienus, the title of king of Palmyra, and Gallienus conferred upon him the command of all the forces in the East. Odenatus obtained several victories over the Persians, but being at last treacherously killed, his wife Zenobia, an aspiring woman, assumed the crown, and styling herself Queen of the East, asserted her sovereignty over Mesopotamia and Syria.

The confusion into which the empire was thrown by domestic dissension and the numerous aspirants to the throne left Zenobia undisturbed for several years, during the latter part of the reign of Gallienus and the subsequent reign of Claudius. But after Aurelianus was proclaimed emperor, he resolved to put down Zenobia, who had extended her conquests over part of Asia Minor. Aurelian soon recovered that province, and defeated Zenobia's troops near Antioch, and afterwards at Emesa, in a great battle in which the queen commanded in person. Zenobia retired to Palmyra, which appears to have been strongly fortified, as it required a long siege and a number of military engines to reduce it. Zenobia endeavoured to escape towards the Euphrates, but was overtaken by the soldiers of Aurelian and made prisoner. Palmyra then surrendered, and Aurelian left a garrison in it. He put to death several of the chief officers of Zenobia, and among others her minister, the philosopher Longinus. After some time the people of Palmyra revolted, and killed the Roman garrison. Aurelian, on receiving information of it in Thrace, marched quickly back to Syria, and having entered Palmyra without resistance, directed an indiscriminate slaughter of the inhabitants. This is averred by his own letter to Probus, whom he appointed governor of the place, and which has been preserved by Vopiscus. Zenobia appeared as a captive in the triumphal procession of Aurelian at Rome, after which she was allowed to reside at a country-house near Tibur, where she spent the remainder of her life. Syncellus says that she married a Roman senator, and had children by him. A Latin inscription at Palmyra, copied by Wood and Dawkins, shows that the place was garrisoned by the Romans under Diocletian, who built or restored several edifices. Justinian is mentioned by Procopius as having fortified Palmyra and placed a garrison in it. The Moslems took it under the caliphate of Abu Bekr, Mohammed's successor. (Ockley, *History of the Saracens.*) We hear no more of Palmyra after this till the twelfth century, when Benjamin of Tudela visited it. He says it was encompassed by a wall, and that there were in it 2000 Jews, valiant and prepared for battle, who make war with the children of Edom and the children of Hagar or the Arabians (the Agarenes of the Christian historians of the middle ages), subject unto the kingdom of Noraldinus, and they help the bordering Ishmaelites. Among them Isaac, surnamed Græcus, and Nathan and Uziel, have the pre-eminence. (Purchas, ix. ch. 5.) The latest historical notice of Palmyra is its plunder in 1400 by the army of Tamerlane. It has been in a ruined and desolate state for centuries past, and the spot is inhabited by a small tribe of Bedowin Arabs, who have built their hovels in the peristyle of the great temple.

The first appearance of Palmyra is very striking. Its innumerable columns and other ruins, extending nearly a mile and a half in length and unobstructed by modern buildings, contrast by their snow-white appearance with the yellowish sand of the desert. But, examined separately, few of these remains can be called beautiful as works of art. The largest columns do not exceed 4 feet in diameter and 40 feet in height. There is a great sameness in the architecture, all the columns being Corinthian, with the exception of those which surround the temple of the Sun, which are Ionic and fluted. (Irby and Mangles, *Travels in Syria, &c. in 1817-18.*) Upon the whole, the ruins of Palmyra are inferior in grandeur and style to those of Baalbek. The most interesting remains of Palmyra are perhaps its sepulchres, which are outside of the walls of the ancient city, and are built in the shape of square towers, from three to five stories high, each forming a sepulchral chamber, with recesses divided into four or five compartments for the reception of the dead bodies. Some of the chambers are ornamented with sculptures and fluted Corinthian pilasters, and the walls are stuccoed white. The ceiling, on which the paint is still perfect, is ornamented like that of the peristyle of the temple of the Sun at Baalbek, with the heads of various deities disposed in diamond-shaped divisions. Remains of mummies and mummy-cloths are found resembling those of Egypt. The lines of the streets and the foundations of the houses are distinguishable in some places. Small rows of columns denote the areas of the open courts of private houses, as at Pompeii. The inscriptions found at Palmyra are either Greek or Palmyrene, with the exception of one in Hebrew and one or two in Latin. On the inscriptions of Palmyra see the work 'Inscriptiones Græcæ Palmyrenorum cum Annotationibus Edw. Bernardi et Thomæ Smithi,' Utrecht, 1698, and that of the orientalist Father Giorgi, 'De Inscriptionibus Palmyrenis quæ in Musæo Capitolino adservantur interpretandis Epistola,' Rome, 1782. Giorgi makes out a Palmyrene alphabet, which Barthélemy had attempted to do before him, but not successfully. The antient commerce of Palmyra has been discussed by Heeren. (*Journal of Education*, vol. ii., and the references there given.)

Wood and Dawkins visited Palmyra about the middle of the last century, and published a description of its remains, with plates, folio, London, 1758. Since that time Volney, Cassas, Bankes, Irby, and other travellers have visited the same.

PALMY'RA (Zoology), Savigny's name for a genus of *Dorsibranchiate Annelids*, distinguishable by their upper fasciculæ, the bristle-like or hair-like processes forming which are large, flattened, disposed in a fan-shape, and brilliant as polished gold. Their cirrhi and branchiæ are but little marked. Their body is elongated, and they have two rather long and three very small tentacles.

The only species known is *Palmyra aurifera*, Sav.

Locality.—Seas of the Isle of France.

PALMYRA, a name applied by the Europeans in India to the stately palm called by botanists *Borassus flabelliformis*. [Borassus.] This by the Hindus is called *Tal* and *Tar*, whence its sap is named *taree*, and this being fermented to produce a spirit, has given origin to the toddy of Europeans. This tree is common in the islands of the Eastern Archipelago and the southern parts of India, and extends even as far north as 30° of N. latitude. Its leaves are employed in making fans and punkahs, and also in thatching: the fruit is eaten: the sap is drank in its natural state, and forms a refreshing beverage, or is evaporated to make *jagury*, or coarse sugar; but if fermented, it forms one of the intoxicating liquors of tropical countries. This tree often presents a very remarkable appearance, that of growing apparently out of the centre of the banyan tree (*Ficus indica*). This has been well explained by Dr. Roxburgh: the seed of the latter, having been eaten by birds, is by them frequently deposited on the moist upper parts of the leaves and spathes of the Palmyra tree, where germinating, it soon sends down its descending shoots or roots, which, in course of time, entirely encircle the palm. This finally appears with only its bunch of leaves projecting beyond the trunk of the banyan-tree, out of which it appears to be growing, though actually older, and, like it, having its roots fixed in the ground.

PALO DE VACA. [Cow-tree.]

PALOMI'NO Y VELASCO, DON ACISLO ANTONIO, an eminent Spanish painter, was born in 1653 (some say 1658), at Bujalance, near Cordova, in the university of which city he became a student, but his predilection for the arts induced him to take instruction in painting from Don Juan de Valdes Leal, in whose company he went in 1678 to Madrid to make himself acquainted with the styles of different schools. He was introduced to king Charles II. by the celebrated Coello, and obtained through the friendship of Carenno a commission to paint the gallery Del Ciervo. He painted the history of Psyche so entirely to the king's satisfaction that he gave him the title of his principal painter and a considerable pension. He obtained such numerous commissions, that notwithstanding his extraordinary industry, he was often unable to do more than furnish the design, leaving it to be finished by his pupil Dionisco Vidal. His reputation continued to increase, and all his works, which he executed at Valencia, Salamanca, Granada, and Cordova, to which cities he was successively invited, were highly approved. It has been a reproach to him that among some of his grandest works, such as the Confession of St. Peter, in the cathedral of Valencia, and those in the cathedral of Cordova, his figures are too faithful transcripts of ordinary life. What he executed himself, whether in oil or in fresco, is distinguished by invention and drawing, and his perspective and colouring are admirable. He died at Madrid, April 13, 1726.

Palomino is the author of a work in three parts, theoretical, practical, and biographical. The first two bear the title of 'El Museo pictorico y Escala optica.' The third part, 'El Parnaso Español pictorico, tomo terceiro,' Madrid, 1724, though perhaps only intended as an appendix to the two others, is by far the most important and interesting. He may be considered, says Fuseli, as the Vasari of Spain, as copious, as credulous, as negligent of dates, too garrulous for energy, too indefinite for the delineation of character, but eminently useful with the emendations of modern and more accurate biographers.

PALOS, a little port of Andalucia, on the south-western coast of Spain, has become celebrated as the spot whence Columbus sailed on his first voyage of discovery on the morning of the 3rd of August, 1492. [Columbus.] Previous to this, the port of Palos had been condemned, owing to some dismeanour of its inhabitants, to maintain two caravels for a twelvemonth for the public service, and it was to this circumstance that it owed, what afterwards proved the honour, of furnishing the vessels employed in the discovery of the New World. The town, which at all times was very small, now contains 1100 inhabitants, whose only trade consists of wine, brandy distilleries for the consumption of Seville, and wood from the pine-forests in the neighbourhood. The only remarkable building is a convent, formerly a temple consecrated to Proserpine, and which, during the middle ages, was occupied by the knights of the Temple.

(Miñano, *Diccionario Geografico de España y Portugal*, vol. vi.; Navarrete, *Coleccion de Viages*, vol. ii.; Muñoz, *Hist. del Nuevo-Mundo*.)

PALSY. [Paralysis.]

PALUDI'NA (Malacology). [Peristomiana.]

PALY'THOA, a genus of zoophytic animals allied to Alcyonium. [Zoantharia.]

PAMIERS, the chief town of an arrondissement in the department of Ariège or Arriège in France. It is situated in the valley of the Arriège, and on the right bank of that river, about 10 miles north of Foix, the capital of the department, and about 40 miles south by east of Toulouse. Pamiers was known in the middle ages by the name of Fredelas or Fredelatum, and it ranked as the capital of the county of Foix. The town is of middling size; and though the streets are well laid out, the houses are ill built. There is a cathedral, said to have been built from the designs of the architect Mansard; also a small theatre. The population, in 1831, was 5150 for the town, or 6048 for the whole commune; in 1836, it was 6905 for the commune. The chief manufactures are of steel, files, scythes, ordinary woollen cloth, and cotton and woollen yarn; the wool employed is Spanish. There are eight yearly fairs. Considerable trade in corn is carried on. The environs of the town are rich in corn, fruit, and pasturage. Pamiers is the seat of a bishopric, the bishop is a suffragan of the archbishop of Toulouse; his diocese comprehends the department. There are in the town a subordinate court of justice and a high school. There is a chalybeate spring in the neighbourhood, which is considered to be serviceable for chronic disorders.

The arrondissement of Pamiers comprehends the northern part of the department, and is divided into six cantons or districts, each under a justice of the peace: it comprehends 115 communes, and had, in 1831, a population of 73,753.

PAMPAS. [Plains.]

PAMPELU'NA, or PAMPLO'NA. [Navarra.]

PA'MPHILUS was a native of Amphipolis (Suidas, *Apelles*), but he studied his art under Eupompus of Sicyon, and succeeded in establishing the school which his master founded. Eupompus was a native of Sicyon and the founder of the Sicyonian school of painting. He introduced a new style of art, and added a third, the Sicyonic, to the till then only acknowledged two distinct styles of painting, known previously as the Helladic and the Asiatic, but subsequently to Eupompus as the Attic and the Ionic. These two styles, with the Sicyonic, henceforth formed the three characteristic styles of Grecian painting. (Pliny, xxxv. 10, 36.) Through his pupil Pamphilus, Eupompus established those principles of art which Euphranor, Apelles, Protogenes, and Aristides successfully developed.

The characteristics of the Sicyonic school were, a stricter attention to dramatic truth of composition, and a finer and a more systematic style of design. The leading principles of Eupompus were, that man should be represented as he actually appears, not as he really is, and that nature herself was to be imitated, not an artist. (Pliny, xxxiv. 8, 19.) Such was the answer which Eupompus gave to Lysippus, upon being asked by him which of his predecessors he should imitate.

Pamphilus succeeded Eupompus in the school of Sicyon, and taught his principles to Apelles. He was, says Pliny (xxxv. 36, 8), the first painter who was skilled in all the sciences, 'omnibus litteris eruditus,' particularly arithmetic and geometry, without which he denied that art could be perfected. By arithmetic and geometry we must understand those principles of the art which can be reduced to rule: by arithmetic, the system of the construction and the proportions of the parts of the human body; by geometry, perspective and optics, at least so much of them as is necessary to give a correct representation of and a proper balance to the figure. Flaxman properly explains the terms by the rules of proportion and motion; he remarks, 'How geometry and arithmetic were applied to the study of the human figure, Vitruvius informs us from the writings of Greek artists, perhaps from those of Pamphilus himself: "a man," says he, "may be so placed with his arms and legs extended, that his navel being made the centre, a circle can be drawn round touching the extremities of his fingers and toes. In the like manner a man standing upright, with his arms extended, is enclosed in a square the extreme extent of his arms being equal to his height."' Flaxman remarks also, that 'it is impossible to see the numerous figures springing, jumping, dancing, and falling in the Herculaneum paintings on the painted vases, and the antique basso-relievos, without being assured that the painters and sculptors must have employed geometrical figures to determine the degrees of curvature in the body, and angular or rectilinear extent of the limbs, and to fix the centre of gravity.'

Such was the authority of Pamphilus, says Pliny (xxxv. 10, 36), that chiefly through his influence, first in Sicyon and then throughout all Greece, noble youth were taught the art of drawing before all others; it was considered amongst the first of liberal arts, and was practised exclusively by the free-born, for there was a law prohibiting all slaves the use of the cestrum or graphis (γραφίς).

In this school of Pamphilus, the most famous of all the schools of antient painting, the progressive courses of study occupied the long period of ten years, comprehending instruction in drawing, 'arithmetic,' geometry, anatomy, and painting in its different branches. The fee of admission was no less than a talent (Pliny, xxxv. 10, 36); a large fee, for the Attic talent, which is most probably here alluded to, was about 219*l.* sterling. Pliny mentions that Apelles and Melanthius both paid this fee. Apelles studied under Ephorus of Ephesus before he entered the school of Pamphilus at Sicyon. Pausias of Sicyon also studied encaustic under Pamphilus, but Pliny does not inform us whether he belonged to his school and paid the above-mentioned fee.

Pamphilus, like his master Eupompus, seems to have been occupied principally with the theory of art and with teaching, for we have very scanty notices of his works. Yet he and his pupil Melanthius, according to Quintilian (xii. 10), were the most renowned amongst the Greeks for composition. We have accounts of only four of his paintings, the 'Heraclidae,' mentioned by Aristophanes (*Plutus*, 385), and three others mentioned by Pliny—the Battle of Phlius and Victory of the Athenians, Ulysses on the Raft, and a relationship, 'cognatio,' probably a family portrait; these pictures were all conspicuous for the scientific arrangement of their parts, and their subjects certainly afford good materials for fine composition.

The period of Pamphilus is sufficiently fixed by the circumstance of his having taught Apelles, and he consequently flourished somewhat before and about the time of Philip II. of Macedon, from B.C. 388 to about B.C. 348. He left writings upon the arts, but they have unfortunately suffered the common fate of the writings of every other antient writer. He wrote on painting and famous painters.

PAMPHILUS was bishop of Caesarea in Palestine, and the intimate friend of Eusebius, who was called Pamphili after him. [EUSEBIUS.] He is said to have been born at Berytus, and to have been educated by Pierius. He spent the greater part of his life in Caesarea, where he suffered martyrdom in the year 309.

He was a man of profound learning, and devoted himself chiefly to the study of the Scriptures and the works of Christian writers. Jerome states that he wrote out with his own hand the greater part of Origen's works. He founded a library at Caesarea, chiefly consisting of ecclesiastical works, which became celebrated throughout the Christian world. It was destroyed before the middle of the seventh century. He constantly lent and gave away copies of the Scriptures. Both Eusebius and Jerome speak in the highest terms of his piety and benevolence.

Jerome states that Pamphilus composed an apology for Origen before Eusebius; but at a later period having discovered that the work which he had taken for Pamphilus's was only the first book of Eusebius's apology for Origen, he denied that Pamphilus wrote anything except short letters to his friends. The truth seems to be that the first five books of the 'Apology for Origen' were composed by Eusebius and Pamphilus jointly, and the sixth book by Eusebius alone, after the death of Pamphilus. Another work which Pamphilus effected in conjunction with Eusebius was an edition of the Septuagint, from the text in Origen's 'Hexapla.' This edition was generally used in the Eastern church. Montfaucon and Fabricius have published 'Contents of the Acts of the Apostles' as a work of Pamphilus; but this is in all probability the production of a later writer.

Eusebius wrote a 'Life of Pamphilus,' in three books, which is now entirely lost, with the exception of a few fragments, and even of these the genuineness is extremely doubtful. We have however notices of him in the 'Ecclesiastical History' of Eusebius (vii. 32), and in the 'De Viris Illustribus' and other works of Jerome. (Lardner's *Credibility*, part ii., c. 59, and the authorities there quoted.)

PAMPHY'LIA (*Παμφυλία*), a province of Asia Minor, formerly called Mopsopia according to Pliny (*Hist. Nat.*, v. 26), extended along the coast of the Mediterranean from Olbia to Ptolemais* (a distance of 640 stadia according to Strabo, xiv., p. 667): it was bounded on the north by Pisidia, on the west by Lycia and the south-western part of Phrygia, and on the east by Cilicia. Pamphylia was separated from Pisidia by Mount Taurus, and was drained by numerous streams which flowed from the high land of Pisidia. The eastern part of the coast is described by Captain Beaufort as flat, sandy, and dreary, but this remark does not apply to the interior of the country, which, according to Mr. Fellows's account (*Excursion in Asia Minor*, p. 204), is very beautiful and picturesque. The western part of the coast is surrounded by lofty mountains, which rise from the sea and attain the greatest height in Mount Solyma on the eastern borders of Lycia. The western part of the country is composed, according to Mr. Fellows (p. 194), 'for thirty or forty miles, of a mass of incrusted or petrified vegetable matter, lying embosomed, as it were, in the side of the high range of marble mountains which must originally have formed the coast of this country. As the streams, and indeed large rivers, which flow from the mountains, enter the country formed of this porous mass, they almost totally disappear beneath it; a few little streams only are kept on the surface by artificial means, for the purpose of supplying aqueducts and mills, and being carried along the plain, fall over the cliffs into the sea. The course of the rivers beneath these deposited plains is continued to their termination at a short distance out at sea, where the waters of the rivers rise abundantly all along the coast, sometimes at the distance of a quarter of a mile from the shore.'

The Pamphylians, according to Herodotus (vii. 91), were descendants of the people who followed the fortunes of Amphilochus and Calchas after the destruction of Troy. They were subdued by Croesus (Herod., i. 28), and afterwards formed part of the Persian empire, and supplied Xerxes with thirty ships in his expedition against Greece (Herod., vii. 91). We know very little of the history of this province, and it is not improbable, considering its proximity to Pisidia [PISIDIA], that its dependence on the Persian empire was oftentimes merely nominal. Under the Syrian kings it formed a separate province including Pisidia; and the same appears to have been the case under the Roman empire, though it seems to have been sometimes united to the province of Galatia. (Tac., *Hist.*, ii. 9.)

Though Pamphylia was of small extent, it contained several towns of considerable importance. Olbia, the first town on the west, is described by Strabo (xiv., p. 667) as a strongly fortified place on the coast; and beyond it, on the western bank of the Catarractes (*Duden*), was Attalia (*Adalia*), founded by Attalus Philadelphus, king of Pergamus. This city was visited by St. Paul in his road from Perge to

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* Pliny (*Hist. Nat.*, v. 26) and Mela (i. 14) make Pamphylia begin at Phaselis, which they reckon a city of Pamphylia; but the majority of writers speak of it as a Lycian city. Livy says that it was the boundary of Lycia and Pamphylia ('in confinio Lyciae et Pamphyliae est,' xxxvii. 23).

Antioch (*Acts*, xiv. 25, 26). Mr. Fellows, who visited Adalia in 1838, speaks of it as a small but clean town, built on a cliff which rises sixty or eighty feet above the sea, and informs us (p. 187) that it contains numerous fragments of antient buildings, columns, inscriptions, and statues, which are generally built into the walls of the town with care and some taste.

East of Attalia, and 60 stadia from the coast, on the Cestrus (*Asku*), was Perge, in the neighbourhood of which was a celebrated temple of the Pergæan Artemis, at which a sacred meeting (πανήγυρις) was held every year (Cic. *in Verr.*, i. 20; Strabo, p. 667). Perge was visited twice by St. Paul; first, when he came from Paphos in Cyprus (*Acts*, xiii. 13), and the second time, on his road from Pisidia (*Acts*, xiv. 24, 25). Perge was situated between and upon the sides of two hills, with an extensive valley in front, and backed by the mountains of the Taurus. (Fellows, p. 191.) It contains several antient ruins; of which the principal are, a large theatre, of the width of 330 feet, a stadium, or course for races, and two or three temples. The next town which we come to is Aspendus, on the Eurymedon, at the distance of 60 stadia from the sea (Strabo, p. 667); the greater part of which was built on a precipitous rock (Arrian, i. 26). It appears to have been a place of considerable importance in the time of Alexander, who punished the inhabitants severely for refusing to contribute fifty talents and supply him with the horses which they had been accustomed to rear for the king of Persia. (Arrian, i. 26, 27.) Under the Seleucidæ it was able to send 4000 men against Selge, a town of Pisidia (Polyb., v. 73, s. 3); and Cicero speaks of it in his time as an antient and noble city, full of works of art (Cic. *in Verr.*, i. 20). The site of Aspendus is doubtful. Most modern maps place the modern village of Starus upon what is usually supposed to be the position of Aspendus; but Mr. Fellows states that no remains of antiquity are to be heard of in the neighbourhood. East of Aspendus, and beyond the Melas, was Side (*Eski*), which was founded by the Æolian Greeks of Cuma in Mysia; but the inhabitants, according to Arrian (i. 26), did not speak Greek. The ruins of Side, which contain a large theatre, have been described both by Captain Beaufort and Mr. Fellows, but they are far inferior to the ruins of most of the other cities of Pamphylia.

PAN, a deity of the Greek mythology, whose country was Arcadia. He was the tutelar god of the shepherds. Pan is represented with two horns, a goat's beard, a goat's tail, and goat's feet, holding the syrinx, a kind of musical pipe, which he was said to have invented. The satyrs are his attendants. Pan is mentioned in the early mythi as having been present at the battle of the Titans, whom he assisted in routing by frightening them by a wild noise which he produced by blowing in a sea-shell. He was also said to have accompanied Bacchus to India, and that upon one occasion, by uttering a loud scream, which was repeated by the echoes, he scared away the enemy. From these incidents the expression 'panic fear,' meaning a terror produced by no obvious or sufficient cause, appears to have been derived. Pan was worshipped at Athens and other Greek cities. His worship was introduced into Italy at an early period, where he was also called Inuus; and festivals, called Lupercalia, were instituted in honour of Pan Lupercus, the protector of the flocks against wolves. According to Servius (note to Virgil's 'Eclogues,' ii. 31) Pan was also considered as the god of Nature, a personification of the universe, the word *pan* (πᾶν), in Greek, meaning 'all,' or 'the whole.'

PAN, the Hindu name of the leaf of the betle pepper. [PIPER BETLE.]

PANÆNUS of Athens, the brother or the nephew of Phidias, the former according to Pliny and Pausanias, the latter according to Strabo, was one of the first of the Greeks who attained to any great excellence in painting; but he has been very improperly termed by some the Cimabue of the Greeks, for although the contemporary, he was many years the junior of Polygnotus, Micon, and Dionysius of Colophon, who had all deservedly attained the greatest fame in Athens considerably before his time.

Panænus assisted Phidias in decorating the Olympian Jupiter, but his most famous work was the 'Battle of Marathon' in the Pœcile at Athens; it contained the Iconics or portrait figures of Miltiades, Callimachus, Cynægirius, generals the Athenians, and of Datis and Artaphernes, generals of barbarians (Pliny, xxxv. 8, 34); their respective names were not attached to the figures in this instance (Æschines 'Against Ctesiphon'), that having already become an antiquated custom. These Iconics have been considered to signify portraits in the fullest sense of the term, but the picture of Panænus cannot have been painted much less than 40 years after the battle of Marathon took place, and nearly as many after the deaths of most of the above-named generals; for the Pœcile was built by Cimon in the 3rd year of the 77th Olympiad, 20 years after the battle of Marathon; the Olympian Jupiter was painted in the 86th, 35 years later, and Pliny mentions the 83rd as the period of Panænus. The portraiture therefore, unless taken from earlier pictures, which is very improbable, must in this instance have been confined to the costume and decorations of generals as known to have been worn by them upon the occasion; and the 'Iconics' consequently, whether paintings or statues, although sometimes portraits in countenance as well as in figure, were apparently not necessarily so.

The painting of the Battle of Marathon was in four great divisions; the first represented the positions of the two armies before the battle, the second and third the principal incidents during the battle, and the fourth the total rout and flight of the Persians; each in itself an extensive composition and forming an independent picture. (Pausanias, i. 15.) It appears that Micon assisted Panænus in painting these pictures, and was fined 30 minæ (108*l.*), for having painted the barbarians larger than the Greeks.

The paintings and decorations of the Olympian Jupiter by Panænus were on the throne and on the wall around the throne of the statue. (Strabo, viii. p. 354.) The subjects of the paintings were, Atlas supporting Heaven and Earth, with Hercules near him about to relieve him from his burden; Theseus and Peirithous; figures representing Greece and Salamis, the latter bearing the rostra of a ship in her hands; the Combat of Hercules with the Nemean Lion; Ajax and Cassandra; Hippodamia, the daughter of Œnomaus, with her mother; Prometheus chained, and Hercules preparing to destroy the vulture which preyed upon him; and Penthesilea dying, supported by Achilles, with Hesperian nymphs bearing fruit. (Pausanias, v. 11.)

Pliny tells us that Panænus painted the interior of the temple of Minerva at Elis with milk and saffron; he painted also the inside of Minerva's shield, but in what manner we are not informed.

Already in the time of Panænus prize contests were established at Corinth and Delphi, in one of which he was defeated by Timagoras of Chalcis at the Pythian games (Pliny, xxxv. 9, 35.) Although this is the only notice we have of Timagoras, he must have been a painter of considerable merit, from this single circumstance. He himself celebrated his own victory in verse.

PANÆTIUS, a Greek philosopher, was a native of Rhodes. He studied at Athens, under Diogenes the Stoic, and afterwards came to Rome, about 140 B.C., where he gave lessons of philosophy and was intimate with Scipio Æmilianus, the younger Lælius, and Polybius. After a time Panætius returned to Athens, where he became the leader of the Stoic school, and where he died at a very advanced age. Posidonius, Scylax of Halicarnassus, Hecaton, and Mnesarchus are mentioned among his disciples. Panætius was not apparently a strict Stoic, but was rather an Eclectic philosopher who tempered the austerity of his sect by adopting something of the more refined style and milder principles of Plato and the other earlier Academicians. (Cicero, *De Finibus*, iv. 28.) Cicero, who speaks repeatedly of the works of Panætius in terms of the highest veneration, and acknowledges that he borrowed much from them, says that Panætius styled Plato 'the divine' and 'the Homer of philosophy,' and only dissented from him on the subject of the immortality of the soul, which he seems not to have admitted. (*Tuscul. Quæst.*, i. 32.)

Aulus Gellius (xii. 5) says that Panætius rejected the principle of apathy adopted by the later Stoics, and returned to Zeno's original meaning, namely, that the wise man ought to know how to master the impressions which he receives through the senses. In a letter of consolation which Panætius wrote to Q. Tubero, mentioned by Cicero (*De Finibus*, iv. 9), he instructed him how to endure pain, but never laid it down as a principle that pain was not an evil. He was very temperate in his opinions, and he often replied to difficult questions with modest hesitation, saying ἐπέχω, 'I will consider.'

None of the works of Panætius have come down to us, but their titles and a few sentences from them are quoted by Cicero, Diogenes Laertius, and others. He wrote a treatise 'On Duties,' the substance of which Cicero merged in his own work 'De Officiis.' Cicero says that Panætius had divided his subject into three parts: the first treated of those cases in which men deliberate between what is honest and what is dishonest; the second, concerning what is useful and what is disadvantageous; and the third, of those cases in which the useful is opposed to the honest; that he treated the two first in a masterly manner, but did not go on with the third part, although he had promised to do so, and though he lived for thirty years after he had composed the others. His disciple Posidonius supplied in some degree the deficiency. (*De Officiis*, iii. 2, and *Epist. ad Att.*, xvi. 11.)

Panætius wrote a treatise 'On Divination,' of which Cicero probably made use in his own work on the same subject. In book ii. 42, Cicero quotes Panætius as 'one among the Stoics who rejected the predictions of the astrologers; and his disciple, Scylax of Halicarnassus, an astrologer himself, and also a distinguished statesman in his native town, as one who despised all the Chaldæan arts of fortune-telling.' Panætius wrote a treatise 'On Tranquillity of Mind,' which some suppose may have been made use of by Plutarch in his work bearing the same title. He wrote also a book 'On Providence,' mentioned by Cicero (*Ad Atticum*, xiii. 8), another 'On Magistrates,' and one 'On Heresies,' or sects of philosophers. His book 'On Socrates,' quoted by Diogenes Laertius, and by Plutarch in his 'Life of Aristides,' made probably a part of the last-mentioned work. Laertius and Seneca quote several opinions of Panætius concerning ethics and metaphysics, and also physics. He argued that the torrid zone was inhabited, contrary to the common opinion of his time. Seneca (*Epist.*, 116) relates his prudent and dignified reply to a young man who had asked his advice on the passion of love. For further information concerning this distinguished philosopher of antiquity, see 'Disputatio Historico-Critica de Panætio Rhodio,' by F. G. van Lynden, Leyden, 1802; and Chardon de la Rochette, 'Mélanges de Critique et de Philologie,' vol. i., Paris, 1812.

PANAMA', THE ISTHMUS OF, constitutes the most eastern and the narrowest portion of the long isthmus by which the two Americas are united. It extends, together with the province of Veragua, which is contiguous to it on the west, from 77° to 83° W. long., between 7° 20′ and 10° N. lat. When measured along its curve, the length from east to west is nearly 400 miles, but its width varies from 30 to 100 miles. It may cover a surface of about 30,000 square miles, or considerably more than the extent of Ireland.

The town of Santa Maria, the first European settlement in America, was founded by Balboa, in 1510, on this isthmus, but the site is now hardly known. Though the comparatively small width of the isthmus was soon discovered, and the great advantages which it offered to a speedy and easy communication between the Atlantic and the Pacific were apparent, yet for three hundred years after this discovery the natural features of this region were entirely unknown. Robertson, in his 'History of America,' observes that the isthmus is traversed in all its length by a range of high mountains; and it is only of late years that Mr. Lloyd, an Englishman, has surveyed the most eastern and narrowest part of it.

Surface, Soil, Climate, and Rivers.—The place where the Andes of South America terminate has not been quite ascertained. On our maps a mountain is laid down, near 8° N. lat., which is called the Peak of Candelaria, but it is not known whether it is connected with the Andes or is an isolated summit. There are some reasons for supposing that it is not connected with that mountain-range. But it is certain that west of this mountain (77° 30′ W. long.) no range of hills or mountains, not even an isolated elevation of moderate height occurs, and that the whole isthmus between the two seas is a flat country, only a few feet above high-water mark. This low country extends westward for more than a hundred miles to the western extremity of Mandingo Bay. The average width of this part of the isthmus does not exceed forty miles, and opposite Mandingo Bay, called also the Gulf of S. Blas, it contracts to less than thirty miles. The shores on both oceans are rocky, and the whole region appears to consist of an immense mass of rock. The rocks however are covered by a thick layer of vegetable mould, and are covered with high forest-trees. The shores of the Caribbean Sea are difficult of access for large vessels, being lined with numerous small rocky islands called *keys*. Two rivers drain the Isthmus. They are called respectfully Chucunaque and Chepo, and rise near 78° 20′ W. long. The Chucunaque runs east-south-east about eighty miles, and turning west by an abrupt bend falls into the Bay of S. Miguel; the Chepo or Ballano runs west-north-west, and empties itself into the Gulf of Panamá about 24 miles east of the town, making a similar turn to the south. Both rivers are navigable for large river barges as far as the places where the great bend occurs. With all the advantages which this region possesses from its great fertility and the vicinity of two great oceans and navigable rivers, it is thinly inhabited, and chiefly by a tribe of Indians, the Mandingoes or S. Blas Indians, who are at constant enmity with the white settlers, though they receive in a friendly manner the vessels which annually visit the country from Jamaica. The whites have only a few settlements on the Chepo river, and even these are chiefly occupied by negroes. The small town of Chepo, above the bend of the river of that name, is the most considerable settlement of the whites, but the inhabitants have little communication with their neighbours the Mandingoes. The scantiness of the population of this region is mainly if not entirely to be attributed to the unhealthiness of the climate. Being open on all sides to a vast expanse of ocean, every wind brings rain, and thus hardly a day passes in which the country is not drenched by heavy showers, which sometimes last for several days together. The surface of the country, not having sufficient slope to carry off such an abundance of moisture, is converted into an immense swamp. This moisture of the air indeed maintains a most luxuriant vegetation, but the great quantity of vegetable matter, which is annually reproduced and decomposed, increases the miasma which exhales from a swampy soil under the influence of a vertical sun.

At the western extremity of Mandingo Bay some hills commence, which gradually attain the elevation of mountains, and extend in a continuous chain as far west as a line drawn across the Isthmus from Port Limones to the town of Panamá, a distance of about 60 miles. These hills advance close to the shores of the Caribbean Sea, where they surround the town of Puerto Velo, but they remain a few miles distant from the Pacific, and are separated from it by a level prairie destitute of trees. These hills occupy nearly the whole width of the Isthmus, but they are divided longitudinally into two ridges, between which lies the valley of the river Chagres. The southern ridge does not exceed 1000 or 1100 feet in height, but the northern rises much higher, especially east of Puerto Velo. These hills are generally covered with thick and almost impenetrable forests. The valley of the river Chagres is rather narrow, but the river itself is navigable to a considerable extent. [CHAGRES.] The climate in this portion of the Isthmus differs considerably in the north and in the south. At Puerto Velo, on the northern coast, the rains are almost continual, and generally descend in torrents, a circumstance which renders that place very unhealthy. At Panamá, on the shores of the Pacific, the seasons are regular. In April the weather becomes cloudy about noon, but after drizzling for half an hour it clears up. In May, from nine to eleven o'clock, it is dull with slight rains, but the afternoon is fine. In June there is rain every morning and evening, but the middle of the day is fair. As the season advances, the rains gradually increase, and are incessant during July, August, September, and October. In November the nights are always rainy and cloudy, but during the days the sky begins to break. In December the weather improves, and in January, February, and March a shower of rain is as uncommon as a beam of sunshine in the other season of the year. The valley of the Chagres seems to partake rather of the climate of Panamá than of that of Puerto Velo. At Panamá the thermometer in the rainy season is 82° during the night and 87° during the day; but the winds being at that season variable and cool, there is no stagnation in the atmosphere, though the rain is incessant. In the dry season the temperature rises to 90° and even 93° in the day-time, and the days are very sultry, inasmuch as calms prevail at that season; but the land-winds at night are cool, coming chiefly from the adjacent mountains; and the climate may be called generally healthy, though a considerable mortality sometimes occurs.

West of a line drawn from the vicinity of Panamá to the

Bay of Limones begins the third region of the Isthmus, which extends westward on the Caribbean Sea to the rocky island called Escudo de Veragua, and on the Pacific to the innermost corner of the Gulf of Parita, a distance of about 80 miles. This country exhibits different natural features. It is, properly speaking, a plain which rises from both oceans with a very gentle ascent towards the middle of the Isthmus. Numerous isolated hills however, rising from 300 to 500 feet above their base, are dispersed over the surface of this plain. These hills occur much more frequently towards the extremities of the region near the mountains of Puerto Velo and the table-land of Veragua; in the middle of the region are plains of considerable extent, especially between the towns of Chagres and Chorrera; on these plains some isolated ridges of hills of inconsiderable height occur. The hills are generally covered with trees, but the plains and low grounds which surround them are savannahs or prairies, destitute of trees, but covered with grass, which supplies pasture to numerous herds of cattle and horses. Though the vegetation of this region is generally much less vigorous than in the country farther east, there are several cultivated tracts and others which may be cultivated. The climate also is much more healthy, especially on the slope towards the Pacific, which in climate and season exactly resembles the country surrounding the town of Panamá. The country along the shores of the Caribbean Sea is far less healthy, and the season much more irregular. Accordingly we find that the southern districts are comparatively thickly settled, while the northern are nearly uninhabited. The principal rivers of this region are the Trinidad and the Caymito or Chorrera. The Trinidad enters the Chagres about 24 miles from its mouth, after a course of about 60 miles. It rises near the south coast, not far from the town of Chorrera, and is navigable in the greatest part of its course as far up as the town of Capua. Traversing the Isthmus in a diagonal line from south-west to north-east, the agricultural produce of the more inhabited districts is conveyed by this river to Chagres. The Caymito or Chorrera is formed by several petty streams which descend from the eastern declivity of the table-land of Veragua, and though its course is short, it is navigable to the town of Chorrera. There is a harbour at its mouth, but the anchorage is bad and exposed.

West of this region is the table-land (mesa) of Veragua. Its eastern ascent is formed by projecting mountains of great elevation, rising abruptly, and frequently exhibiting an almost perpendicular face of bare rock. The surface of the table-land itself is very uneven, and several summits on it rise to a great height. The Peak de Veragua is stated to attain nearly 9000 feet above the sea-level. In some places however there are plains of considerable extent. The general elevation of this table-land above the sea-level is supposed to be between 3000 and 4000 feet. It approaches the Caribbean Sea within a few miles, and is separated from it by a narrow and slightly hilly tract. But on the side of the Pacific the mountains approach close to the sea, and between the Gulf of Parita and the Bay of Montijo project in a wide and mountainous peninsula into the Pacific. This peninsula terminates in the capes called Punta Mala and Punta Mariata. We are very little acquainted with the climate and soil of this region, but as it undoubtedly is much more populous than the lower part of the Isthmus, it must be presumed that it is favourable to agriculture and to the health of the inhabitants. This last circumstance is due to the great elevation of the surface above the sea-level. The rivers which descend from this table-land are interrupted by rapids and cataracts, and bring down great quantities of earthy matter, which they deposit at their mouths. All these rivers accordingly have a bar, with a very few feet of water on it, which renders them incapable of receiving vessels above 100 tons burden.

The most western portion of the Isthmus of Panamá begins at the western declivity of the table-land of Veragua, and extends to the boundary-line of Central America. This line begins on the shores of the Caribbean Sea at Chica or Monkey Point, and terminates on the Pacific at Punta Boruca. This region is rather more than 100 miles from east to west, and about 70 miles from north to south. The northern part is occupied by the Chiriqui Lagoon, a sheet of water 90 or 100 miles in length from east to west, and on an average twenty miles wide. It is separated from the Caribbean Sea by a series of low, swampy, and wooded islands, between which there are three deep passages for vessels. The most commodious of these passages is the most eastern, near a tongue of land projecting from the continent. It is called Chiriqui Mouth, and may be navigated by the largest vessels. Farther west is the entrance, called Boca del Toro (Bull's Mouth), which is only 18 feet deep, and narrow, but of easy access. The most western, called Boca del Dragon (Dragon's Mouth), is also narrow, but very deep. The middle portion of the lagoon is occupied by low woody islands, but at each extremity a considerable space is free from islands, and affords excellent anchorage, as the lagoon is deep, and the swell of the Caribbean Sea is broken by the intervening islands. The country contiguous to the southern shores of the lagoon, for a distance of about 20 miles, is low and swampy, the soil being covered with a thick layer of alluvium produced by the annual inundations during the rainy season. At the back of this low tract, which is generally wooded, the country rises, and though it contains plains of some extent, it continues to rise gradually for 40 or 50 miles from the lagoon, where it is bordered by a continuous ridge of high ground. This chain, which is called the Cabecares Mountains, may be between 4000 and 5000 feet above the sea-level, but it is of very inconsiderable width, being only about 500 yards across in its upper part, which extends in nearly a straight line without any peaked summits. The southern slope of this ridge is much more rapid, occupying only about 10 miles in width, and terminating on the Pacific in tolerably level tracts, which however are many feet above the level of the sea. The whole country north of the Cabecares Mountains is one continuous forest of lofty trees, but along the Pacific there are several woodless tracts. It is only in the last-mentioned district that the whites have formed a few establishments, the extensive country north of the Cabecares Mountains being in possession of the native tribes, especially the Valientes. This may be attributed to the climate, which on the coast of the Pacific resembles that of Panamá, being subject to regular changes of the seasons, and therefore healthy. But the low country about the Lagoon of Chiriqui is drenched with rain nearly all the year round: the more elevated tract however between it and the Cabecares Mountains has more regular weather, and is considered tolerably healthy. The numerous rivers which run from the northern slope of the mountains into the Chiriqui Lagoon are impeded by many rapids and cataracts until they reach the low country, where their course is gentle, and where they may be navigated by large boats; but they have bars across their mouths, with little water on them.

Productions.—This isthmus is very rich in vegetable productions. Lloyd has given a list of 96 trees, useful as timber, dye-woods, or for cabinet-work and domestic purposes. Some of them bear eatable fruits. It also produces all the fruits and esculent vegetables cultivated in other intertropical countries. The cultivated grains are rice and Indian corn. The sugar-cane is grown, but not extensively. Coffee and cacao are cultivated for domestic consumption; a small quantity of the latter is exported. The caoutchouc tree, milk tree (Palo de Vaca), sarsaparilla, and vanilla plant grow in the woods. The *Styrax officinalis* is very abundant, and its gum sells very dear. Cattle, horses, and mules are reared in those districts where there are natural prairies or savannahs. The woods are inhabited by numerous wild animals: tiger-cats, which seldom exceed the size of a small Newfoundland dog; lions, bears, racoons; sajinos, or a species of wild boars, which are frequently met in droves, and attack men; deer; conejos, which are somewhat like our rabbits, but larger; hosts of monkeys; wild turkeys, both black and coloured, and many other birds. The sea abounds with fish, especially sharks, which are eaten, alligators, and turtle. It does not appear that the snakes and poisonous reptiles for which the Isthmus was formerly noted exist in great number. There are gold-mines in the mountains near Puerto Velo, but their produce is insignificant. Gold is also said to be found on the northern declivity of the table-land of Veragua, and in the country of the Valientes. Copper and iron are abundant, and tin and mercury are stated to occur.

Political Divisions; Harbours; Towns.—The Isthmus constitutes one of the departments of the republic of New Granada, that of *Istmo*, and is divided into two provinces, the province of Panamá, which comprehends all the countries east of the table-land of Veragua, and the province of Veragua, which extends over the table-land of that name and the country south of the Chiriqui Lagoon, to the boundary-line of Central America. The province of Panamá is subdivided into six and that of Veragua into four cantons.

The coast along the Caribbean Sea, from the Bay of Candelaria, into which the river Atrato falls, to the Bay of Mandingo, does not present a single harbour for large vessels. It is lined by a continuous series of small keys, or rocky islands, lying from half a mile to a mile from the continent. The inner passage thus formed is full of coral rocks and reefs, but the water is so clear that they are easily seen and avoided in the day-time. Otherwise a vessel finds safe anchorage there, except during the prevalence of the north-western winds (from December to April), as the swell of the sea is broken by the islands. The first harbour which occurs on this coast is that of Puerto Bello, or Velo, which is about two miles long, and on an average 1000 yards wide. It is of considerable depth, and, being surrounded by high hills and mountains, affords excellent and safe anchorage for vessels. Though it once was a place of great trade, it is now rarely visited, on account of its excessive unhealthiness. The town, which is built on the southern shores of the harbour, consists of one long street with a few short streets branching off where the ground will admit of them. It is surrounded by mountains covered with dense forests: it contained, in 1827, not more than 1122 inhabitants, negroes and mulattoes. About 20 miles farther west is the Bay of Limones, or Puerto de Naos, which has an entrance five miles wide, free from danger. It is several miles deep, and several projecting points on its western side afford secure and commodious anchorage within them, especially the innermost, which is at present considered as the harbour. The climate is comparatively healthy, but it is not visited, the surrounding country being uninhabited. A few miles farther west is the harbour of Chagres, a little sandy bay, which is only open to westerly winds, and is formed by the mouth of the river of the same name. A ledge of rocks runs across its mouth, with not more than 15 feet of water in the deepest place, and in many rising even to the surface. Under the most favourable circumstances no vessel drawing more than twelve feet can enter the harbour. Farther westward there is no harbour, except those afforded by the Chiriqui Lagoon.

The harbours on the shores of the Pacific are all within the Gulf of Panamá. There appears to be no port west of Punta Mala. The opening of the Gulf of Panamá is between Punta Francisco Solano on the continent of South America and Punta Mala, where it is about 130 miles wide, which breadth it preserves for about 10 miles northward, when it begins to contract. In the northern and narrower portion of the bay there is a group of islands, called Archipelago de las Perlas, on account of the pearls which were formerly procured in the adjacent sea in great abundance, and still are taken in a considerable amount. The largest of these islands, called Isla del Rey, rises to a considerable elevation. Most of the rivers which fall into this bay admit vessels of considerable burden. They have indeed bars across their mouths, on which there is rarely more than three feet of water at low tides, but as the tides in this bay rise 18 feet, the bars may be passed at high-water, and inside of them the harbours are deep. The rivers which are sometimes visited by vessels are the river Pacora, about 18 miles east of the town of Panamá, and the Rio Grande, which enters the sea about two miles west of that town.

PANAMÁ is the principal trading-place on this bay. It stands on a tongue of land shaped nearly like a spear head, extending a considerable distance out to sea, and gradually swelling towards the middle. The principal streets extend across the peninsula from sea to sea. The houses are of stone, generally two or three stories high, substantially built, and the larger houses have courts or *patios*. The public edifices are, a beautiful cathedral, four convents, a nunnery of Santa Clara, and a *college*. As the sloping shore contiguous to the ground on which the town stands is dry at low-water to a considerable distance, the anchorage is about 6 or 7 miles distant, where it is protected by a number of islands, the largest of which is called Perico, a name which is also applied to the harbour. These islands are high and well cultivated, and supplies of ordinary kind, including excellent water, may be obtained from most of them. In 1827 the town had nearly 11,000 inhabitants. It carried on a considerable trade with several of the ports of South America, especially with Guayaquil.

In the interior of the Isthmus, west of Panamá, there are several considerable towns. The town of Chorrera, on the banks of the Caymito or Chorrera, has 4000 inhabitants. Natá has a population of 4259, and Los Santos of 4318. These two places are near the shores of the Bay of Panamá, but have no harbours. In the province of Veragua, the capital, Santiago de Veragua, had, in 1822, 4580 inhabitants; the town of La Mesa, 4421; and Santiago de Alanje, 2611.

Inhabitants and Population.—A great portion of the Isthmus, perhaps one-third, is still in the exclusive possession of the aborigines. These tribes occupy both extremities of the Isthmus. Nearly the whole of the Isthmus east of the Bay of Mandingo is inhabited by several small tribes, comprehended under the collective appellation of Mandingo or San Blas Indians. Roberts thinks that they are a race of people quite distinct from the other natives on the southern and western shores of the Caribbean Sea. He describes them as much shorter in stature, few of them exceeding five feet two or three inches in height, with a full chest and broad shoulders, and foreheads low and rather flat. Their eyes are small, and generally of a black or dark brown colour, their cheek-bones broad and full, and their lips not very thick. Among them he found some Albinos, who had been observed by earlier travellers. They are an active hardy race of people, very jealous of their independence, and hostile to the whites who have settled near them. The men do not go naked; the women are clothed in wrappers of blue baftas, or striped cotton, reaching from the breast to a little below the calf of the leg. They cultivate plantains, bananas, maize, and mandiocca, though the adjacent sea and the rivers abound in fish and turtle, and the forests in eatable animals. They also rear many fowls.

The western portion of the Isthmus, which surrounds the Chiriqui Lagoon, is inhabited by the Valientes, a collective name given by the Spaniards to different tribes inhabiting that part of the country. They are much taller than the Mandingo Indians, and seem to have made greater progress in civilization. Their dress formerly consisted of a covering made of a sort of tree-bark, six or seven feet long, and about five feet wide, with a hole cut in the centre to admit the head; but they have now partly adopted the European dress, and many of them put on a complete European suit. Their extensive plantain-grounds, maize-fields, and mandiocca plantations exhibit a great deal of industry and care; and among other things they plant the cacao-tree, the produce of which is extensively used.

The population of those parts of the Isthmus in which European settlements have been made consists chiefly of mulattoes and negroes, the number of whites being comparatively small, except in Panamá and in the larger towns. This however applies chiefly to the province of Panamá. According to a census taken in 1822, the department of Istmo contained a population of 101,550 individuals, viz.:—

Province of Panamá.		Province of Veragua.	
Canton of Darien ..	1,172	Canton of Santiago ..	14,170
" Puerto Velo	2,425	" Remedios	5,010
" Panamá ..	16,724	" La Mesa ..	8,722
" Chorrera ..	7,411	" Alange ..	7,465
" Natá ..	17,108		
" Los Santos	21,346		35,367
	66,186		

Commerce.—The countries inhabited by the Mandingo and Valientes Indians are annually visited by several vessels from Jamaica, which export considerable quantities of tortoiseshell, sarsaparilla, and fustic, and also some cacao; they import manufactured cotton goods, cutlass-blades, and a variety of toys and small articles. The port of Chagres is annually visited by from thirty to forty European vessels, which bring manufactured articles and wines, which are mostly paid for in bullion brought from the countries of South America bordering on the Pacific, to which parts the greater part of the cargoes are shipped at Panamá. The harbour of Panamá is usually visited by about thirty vessels, mostly from Guayaquil, Lambayeque, and Callao. They import sugar for the consumption of the country, and bullion and cacao for re-exportation. These goods are transported either on mules or by the natives on their shoulders from Panamá to Cruces, on the Chagres river, where they are embarked in boats, and go down the river to Chagres.

If a canal for large vessels could be made across any part of this Isthmus, not only the communication between Europe and the countries of America bordering on the Pacific would be much facilitated, but vessels bound for China and the countries of Eastern and Southern Asia would prefer a voyage which, besides being much shorter than that round the Cape of Good Hope, would have the advantage of a continual favourable wind (the trades). The execution of such a canal has repeatedly been suggested; and Mr. Lloyd was sent, in 1827, by Bolivar, then president of the republic of Colombia, to survey the country, with a view of improving the communication across the Isthmus. Mr. Lloyd, in what he has written on the subject, does not speak of a canal, probably because in the then circumstances of the republic of Colombia it was an enterprise quite out of the question. His description of the country however shows that it may be considered next to impossible to make such a canal across the narrowest part of the Isthmus, opposite the Bay of Mandingo. It appears that though there are no obstacles to the execution of such a work in the surface and soil which could not be overcome, the climate is so unhealthy, that the lives of many thousands would be sacrificed, and probably the mortality among the workmen would soon stop the progress of the work. If a canal for large vessels across the Isthmus is practicable, it can only be made west of the mountains which lie between Panamá and Puerto Velo, perhaps along the line which Mr. Lloyd proposes for improving the communication between the Caribbean Sea and Panamá. This line would begin at Limones, or Navy Bay, about five miles east of Chagres, which, though uninhabited, is an excellent harbour, and might easily be much improved. From this place he proposes a canal to be made to the banks of the river Chagres, which is only two miles and a half from the harbour; and as the intervening tract is a level, the canal could probably be made without locks. That river would then be ascended to its junction with the Trinidad river, and the latter to a place where its shores on the south bank are well suited for being converted into wharfs and landing-places, and thence finally to Panamá or Chorrera by a railroad. It may be supposed that if a more minute survey were made of this country with the view of making a canal across the whole isthmus, a straighter and shorter line might be discovered. Mr. Lloyd observes that the mean rise and fall of the tide in the Pacific two days after full moon is 21·22 feet; and that the difference between the extreme elevation and depression occasionally amounts to 27·44 feet. In the Caribbean Sea, at Chagres, the mean elevation of the tide is only 1·16 feet. The water at high-water mark in the Atlantic is 13·55 feet lower than in the Pacific.

History.—Columbus, in his fourth voyage, being in search of a strait which would conduct him to the Indian Ocean, discovered the whole coast between Cape Gracias à Dios and the harbour of Puerto Velo in 1502 and 1503. He intended to plant a small colony upon the river Belen in Veragua, but was prevented by the insubordination of his crew from making the first European settlement on the continent of America. This was done in 1510 by Nuñez de Balboa, who built the town of Santa Maria, on the Gulf of Darien; and in 1512, in traversing the Isthmus, he discovered the Pacific Ocean. As the climate along the coast of the Gulf of Darien is very unhealthy, Pedrarias Davila removed the colony from Santa Maria to Panamá; and the Spaniards, who were in quest of gold, soon spread over the Isthmus, and settled at several places. When the Spanish government divided its American possessions into large provinces, the Isthmus of Panamá was incorporated into the viceroyalty of Granada. The settlements on this Isthmus were frequently taken and plundered by the Buccaneers, especially by Henry Morgan. [BUCCANEERS.] In the beginning of the present century the Spanish colonies on the Tierra Firma obtained their independence after a long and bloody struggle, and the Isthmus of Panamá then formed first a department of the republic of Colombia, and afterwards of New Granada, under the name of Istmo.

(Lloyd, in the *Philosophical Transactions* for 1830, and the *London Geographical Journal*, vol. i.; Ulloa's *Voyage to South America;* Roberts's *Narrative of Voyages and Excursions on the East Coast and Interior of Central America;* Haigh's *Sketches of Buenos Ayres, Chili, and Peru.*)

PANATHENÆA (Παναθήναια), the greatest of the Athenian festivals, was celebrated in honour of Athena (Minerva) as the guardian deity of the city (Ἀθήνη πολιάς). It is said to have been instituted by Ericthonius, son of Hephæstus (Harpocrat., Παναθ.), and to have been called originally Athenæa (Ἀθήναια); but it obtained the name of Panathenæa in the time of Theseus, in consequence of his uniting into one state the different independent states into which Attica had been previously divided. (Paus., viii., 2, s. 1; Plut., *Thes.*, c. 20; Thucyd., ii. 15.)

There were two Athenian festivals, which had the name of Panathenæa; one of which was called the Great Panathenæa (μεγάλα Παναθήναια), which was celebrated once in every five years with very great magnificence, and attracted spectators from all parts of Greece; and the other, the Less Panathenæa (μικρά Παναθήναια), which was celebrated every year in the Piræus. (Harpocrat., *loc. cit.*; Plato, *De Rep.*, i. 1.) When the Greek writers speak simply of the festival of the Panathenæa, it is sometimes difficult to determine which of the two is alluded to; but when the Panathenæa is spoken of by itself, and there is nothing in the context to mark the contrary, the presumption is that the Great Panathenæa is meant; and it is thus spoken of by Herodotus (v. 56) and Demosthenes (*De Fals. Leg.*, p. 394).

The Great Panathenæa was celebrated on the 28th day of Hecatombæon (Proclus, quoted by Clinton, *Fast. Hell.*, p. 325), the first of the Athenian months, which agrees with the account of Demosthenes (*C. Timocr.*, p. 708, 709), who places it after the 12th day of the month. There is considerable dispute as to the time in which the Less Panathenæa was celebrated. Meursius places its celebration in Thargelion, the eleventh of the Athenian months; but Petitus and Corsini, in Hecatombæon. Mr. Clinton, who has examined the subject at considerable length (*Fast. Hell.*, p. 332-335), supports the opinion of Meursius; and it does not appear improbable that the Less Panathenæa was celebrated in the same month as the Great, and was perhaps omitted in the year in which the great festival occurred. The celebration of the Great Panathenæa only lasted one day in the time of Hipparchus (Thucyd., vi. 56); but it was continued in later times for several days.

At both of the Panathenæa there were gymnastic games (Pind., *Isthm.*, iv. 42; Pollux, viii. 93), among which the torch-race seems to have been very popular. In the time of Socrates there was introduced at the Less Panathenæa a torch-race on horseback. (Plato, *De Rep.*, i. 1.) At the Great Panathenæa there was also a musical contest, and a recitation of the Homeric poems by rhapsodists. (Lycurg., *C. Leocr.*, p. 209.) The victors in these contests were rewarded with vessels of sacred oil. (Pind., *Nem.*, x. 64, and Scholia; Schol. on *Soph. Oed. Col.*, 698.)

The most celebrated part however of the Great Panathenaic festival was the solemn procession (πομπή), in which the Peplus (Πέπλος) or sacred robe of Athena was carried through the Ceramicus and other principal parts of the city to the Parthenon, and suspended before the statue of the goddess within. This Peplus was covered with embroidery (ποικίλματα, Plato, *Euthyph.*, c. 6), on which was represented the Battle of the Gods and the Giants, especially the exploits of Zeus and Athena (Plato, *loc. cit.;* Eurip., *Hecub.*, 466), and also the achievements of the heroes in the Attic mythology, whence Aristophanes speaks of 'men worthy of this land and of the Peplus.' (*Equit.*, 564.) The embroidery was worked by young virgins of the noblest families in Athens (called ἐργαστῖναι), of whom two were superintendents, with the name of Arrephoræ. When the festival was celebrated, the Peplus was brought down from the Acropolis, where it had been worked, and was suspended like a sail upon a ship (Paus., xxix. 1, s. 1), which was then drawn through the principal parts of the city. The procession which accompanied it consisted of persons of all ages and both sexes, of foreigners resident at Athens as well as of citizens. The old men carried olive branches in their hands, whence they were called Thallophori (θαλλοφόροι), and the young men appeared with arms in their hands, at least in the time of Hipparchus. (Thucyd., vi. 56.) The young women carried baskets on their heads, whence they were called Canephori (κανηφόροι). The sacrifices were very numerous on this occasion. During the supremacy of Athens every subject state had to furnish an ox for the festival. (Schol. on Aristoph. *Nub.*, 385.) It was a season of general joy; even prisoners were accustomed to be liberated, that they might take part in the general rejoicing. (Schol. on Demosth. *Timocr.* 184.) After the battle of Marathon, it was usual for the herald at the Great Panathenæa to pray for the good of the Plataeans as well as of the Athenians. (Herod., vi. 111.)

The procession, which has been described above, formed the subject of the bas-reliefs which embellished the outside of the temple of the Parthenon, which are generally known by the name of the Panathenaic frieze. The blocks of marble of which this frieze was originally composed, were three feet four inches high, and they formed a connected series of 524 feet in length. A considerable portion of this frieze, which is one of the most splendid of the ancient works of art, is in the British Museum, and is described in the 'Elgin Marbles,' published by the Society for the Diffusion of Useful Knowledge, vol. i., p. 161-231.

A full and detailed account of this festival is given by Meursius, in a work on the subject, which is printed in the seventh volume of the 'Thesaurus' of Gronovius.

PANAY. [PHILIPPINE ISLANDS.]

PANCAKE, a thin cake of batter fried or baked in a pan. The annual custom of frying pancakes (in turning or tossing which in the pan there was usually a good deal of pleasantry in the kitchen) is still retained in many families of the better sort throughout the kingdom on Shrove Tuesday, and was formerly universal. The church bell which used to be rung on that day, to call the people together, in Roman Catholic times, for the purpose of confessing their sins, was called the pancake-bell, a name which it still retains in some places. At Newcastle-upon-Tyne, Brand says, the great bell of St. Nicholas church is tolled at twelve o'clock at noon on this day; shops are immediately shut up, offices closed, and all kind of business ceases, a little carnival ensuing for the remainder of the day. Macaulay, in his 'History and Antiquities of Claybrook in Leicestershire,' 8vo., London, 1791, p. 128, says, 'On Shrove Tuesday a bell rings at noon, which is meant as a signal for the people to begin frying their pancakes.'

According to Brand (*Popular Antiq.*, vol. i., p. 75), a kind of pancake feast preceding Lent was used in the Greek church, from whence we may probably have borrowed it, with pasche eggs and other such ceremonies. The Russes, Hakluyt says, begin their Lent always eight weeks before Easter. The first week they eat eggs, milk, cheese, and butter, and make great cheer with pancakes and such other things. [SHROVETIDE.]

PA'NCHA-TANTRA, a celebrated collection of fables in the Sanscrit language. It owes its name to its division into five *Tantras*, or chapters, which are headed—1, *mitra bhéda* (*dissension of friends*); 2, *mitra prápti* (acquisition of friends); 3, *kákolúkíya* (inveterate enmity; lit., 'the war of the crow (*káka*) and the owl (*ulúka*);' 4, *labdha pranásana* (loss of advantage); 5, *aparíkshita káritwa* (inconsiderateness). It is also more commonly known in India under the name *Pánchópákhyána* (*pancha-upákhyána*), 'the five (collections of) stories.' The author is reputed to have been Vishnu-Sarmá, and the collection was probably first published in the sixth century A.D., for it quotes Varahamihira, who did not write till A.D. 540, and it was carried from India to Persia in the reign of Nushirvan, king of Persia, who died A.D. 579.

Barzuyeh, the physician of this prince, who was the importer of the *Pancha-tantra*, got it translated into old Persian, under the title of *The Fables of Bidpai* (in Sanscrit, *Vidyá-priya*, 'the friend to science,' or 'the physician'). In the year 760 A.D., or thereabouts, it was translated into Arabic by Abdallah Ebn Mokaffa, under the title *Kalila wa Dimnah*, from *Karataka* and *Damanaka*, the Sanscrit names of the two jackals who are the chief interlocutors in the first *Tantra*, in the same way as *Sanjívaka*, the name of the ox who falls and is left behind, is transformed into *Shanzebah* in the Arabic version. From this Arabic version, from a Greek translation of it by Simeon Sethi, about the year 1080, and from a Latin translation by John of Capua, in the thirteenth century, this collection of fables was translated to all the languages of Europe, and most of the stories of which it is composed are familiar to persons conversant with modern literature; for instance, the story of the faithful dog killed by the hasty parent, after having successfully guarded the life of her child, which appears in most European collections of fables, and also forms the subject of a ballad ('Beth Gelert'), is derived from the story of the Brahman and the ichneumon in the fifth book of the *Pancha-tantra*; and an incident from the story of Déva-Sarmá, in the first book, appears among other works in the *Cheveux coupés* of Guérin, in Massinger's 'Guardian,' and in Beaumont and Fletcher's 'Women pleased.' The original text of the *Pancha-tantra* has not yet been printed, but there is a Sanscrit epitome of it, known by the name *Hitópadésa* (the friendly instruction), which is in the hands of all Sanscrit scholars, and has been translated both by Sir C. Wilkins and by Sir W. Jones. It seems that the *Pancha-tantra* was composed at or near the city of Mihilapur, or St. Thomé, which is called Mihilárópyam, in the introduction to the book.

In the 'Transactions of the Royal Asiatic Society,' vol. i., p. 155, there is an admirable 'Analytical Account of the *Pancha-tantra*, illustrated with occasional translations,' by Professor Wilson.

PANCRA'TIUM, a genus of plants of the natural family of Amaryllideæ, having a funnel-shaped flower with a long tube. Six superior sepals, and as many stamens, which are inserted on the edge of a 12-cleft membranous cup. Pistil single. The name was applied by the Greeks to some plant allied to *Scilla maritima*, but which has not yet been made out by botanists. The name is now applied to a genus of ornamental plants, found in the equinoctial parts both of the old and of the new world, and of which one species extends to the coasts of the Mediterranean. They are mostly highly ornamental plants with white flowers, many of them fragrant; they are commonly cultivated in stoves, and require a mixture of light loam and rich vegetable mould, with little water when not in a growing state.

PA'NCREAS is a secreting gland situated behind the stomach and extending from the spleen transversely across the vertebral column to the duodenum. In man it is of an elongated and slightly flattened form, broadest at its right extremity, and gradually diminishing in breadth towards the left. It is of a firm consistence, lobulated, and very similar in structure to the salivary glands, from which circumstance it is often called the salivary gland of the abdomen. It is chiefly composed of the ramifications of the main duct, through which its secretion is poured into the bile-duct, or into the duodenum by a separate aperture close to that of the bile-duct. [LIVER.] The trunk of the pancreatic duct, soon after its opening into the end of the bile-duct, or into the duodenum, dilates and passes along the middle of the gland, giving off on each side numerous branches, which, again and again dividing, terminate in minute cells or lobules, which are closed on all sides, and are congregated in bunches to form the principal lobes of the glands.

Upon the walls of these ducts and their vesicular terminations the blood-vessels of the pancreas ramify and form a close capillary net-work, through whose walls the peculiar secretion is poured. This is a ropy, slightly acid, and opaline fluid, very similar to saliva, containing a small quantity of albumen and some other animal matters in solution. It is presumed to assist in the office of assimilating the food, which, just before the pancreatic fluid is added, has been converted into chyme in the stomach, and is undergoing the process of conversion into chyle; but the exact nature of its function is at present unknown. [DIGESTION.]

The pancreas is found in its least developed form in fish, in some of which it consists of simple or slightly branching tubes or sacs, attached to the duodenum very near its commencement, and commonly called appendices pyloricæ. In the amphibia and birds it gradually increases in the complexity of its arrangement, and it is most compact and most highly developed in the mammalia.

Of all the organs in the body, the pancreas is probably the least liable to disease, and those from which it is occasionally found to have suffered are not indicated during life by any peculiar symptoms.

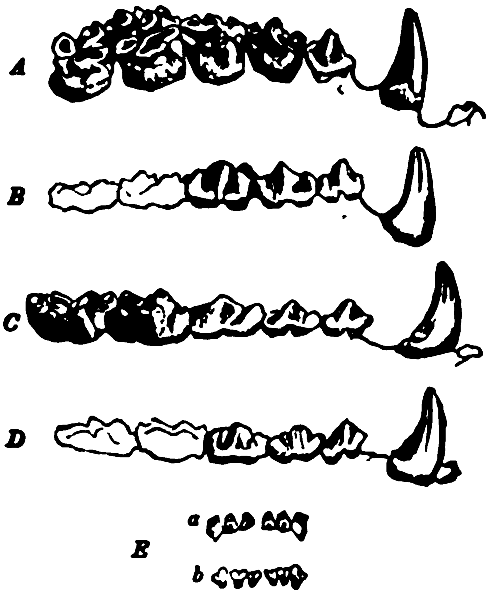
PANDA, one of the names of the genus *Ailurus* (F. Cuv.).

On the 6th November, 1821, an elaborate description of this interesting animal by General Hardwicke was read to the Linnean Society of London. The publication was delayed till the author's return to England, when he brought with him a second skull of the same species from India. Whilst the paper was going through the press, he found that a description and figure had been recently published by M. F. Cuvier in his *Histoire des Mammifères*, under the name of *Ailurus fulgens*, and the General's name was therefore, with his consent, suppressed.

The French attribute the discovery of the animal to M. Duvaucel.

Generic Character.—*Head* subglobose, great; *face* subrotund; *cheeks* tumid; *forehead* flat, elongated, broad; *tongue* rather rough; *snout* short, conical, very broad; *rictus* moderate; *rhinarium* obtuse; *nostrils* terminal; *ears* short, acute, distant, villous; *eyes* approximated to the *rhinarium* and placed anteriorly; *maxilla* intumescent; *mandible* subrecondite; a few white *vibrissæ*. *Neck* short. *Body* large, cylindrical, obese, clothed with a very villous under-fur, and long, equal, rather soft hairs, downy at their base. *Tail* of the length of the body, very large at the base, cylindrical, subattenuated at the tip and clothed with very long spreading hair. *Feet* plantigrade, five-toed; the *soles* thickly clothed with a very fine down; *claws* falculate, compressed, arcuate, very sharp (retractile).

Dental formula:—Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{5-5} = 36$.



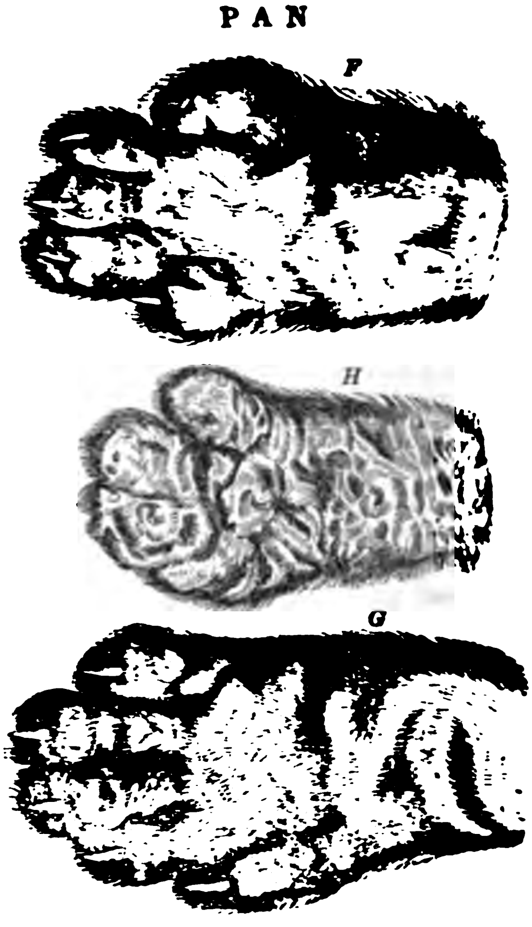
Teeth of Ailurus.

A, lateral view of the teeth of the upper jaw, as they are seen within. *B*, the same as they are seen without. *C*, lateral view of the teeth in the lower jaw, as they appear within. *D*, the same as they appear without. *E*, front teeth; *a*, upper jaw; *b*, lower jaw. (Hardwicke, *Linn. Trans.*)

Example, *Ailurus fulgens*. (F. Cuvier.)

Description.—Body above beautiful fulvous brown, which becomes lighter on the back and assumes a golden hue. The brown colour extends with a somewhat deeper shade to the neck, the sides of the head, and the ears posteriorly; a band of the same colour arises from the ears, and unites to the back of the neck. The face, snout, and ears white; a few fulvous and yellowish hairs are mixed with the white covering of the forehead. The abdomen and extremities black, and separated by a defined line from the colour of the upper parts. The tail is banded alternately fulvous brown and yellow, and tipped with black. The woolly covering of the soles of the feet of a black or greyish colour. Length of the head 7½ inches; from the occiput to the root of the tail 19½ inches; length of the tail 15 inches: total 3 feet 6 inches. (Hardwicke.)

'The peculiarities of our animal,' says the General in continuation, 'on which its rank as a genus depends, are striking and prominent; but its disposition in a natural series is still obscure, as it resembles in several characters the individuals of that subdivision of digitigrade carnassiers, from which it differs essentially both in its teeth and in its plantigrade walk. Among the peculiarities of our animal are to be noticed the great breadth of the rostrum and the singular structure of the teeth: but the most remarkable character, and that on which its distinction principally depends, is the form of the projecting points of the posterior grinders. This character, as far as our observation extends, is peculiar; it does not exist, except in a small degree, in any other genus of carnivorous quadrupeds. The truncation is owing, in our opinion, to original structure, and is not produced by the wearing down of the points. We observe it both in the skull of a young animal and in that of the adult specimen from which the annexed drawing was made; and our description is confirmed by a careful comparison of the relative elevation of the points of the two anterior grinders, in which, although they are equally exposed to attrition, this truncation is not observed. The margins bounding the truncated points, as is shown in the drawing, are circumscribed and perfect, exhibiting no signs of being worn down by attrition. In the disposition and even in the form of the teeth, our animal bears some resemblance to the genera *Nasua* and *Procyon*; but these differ essentially in the lengthened form of the head, and in the extended rostrum, which is terminated by a flexible rhinarium; they also differ in the number, character, and distribution of the grinders. *Nasua* and *Procyon* have in both jaws six grinders, of which the three anterior are false grinders; and of those which follow, none of the points, even in the adult state, exhibit the truncation above described. Our animal has only one false grinder with a compound crown, and the four posterior grinders are large and highly complicated: the first of these in the upper jaw corresponds with the fourth grinders in *Nasua* and *Procyon*, and the points are attenuated and acute; but the posterior grinders are quite peculiar and characteristic in their structure.'



Feet of Ailurus.

F, anterior foot, left side. *G*, posterior foot, right side. *H*, sole of one of the posterior feet, to show its hairy covering. (Hardwicke, *Linn. Trans.*)

Habits, &c.—General Hardwicke states that this animal's haunts are about rivers and mountain-torrents. It lives much in trees, and feeds on birds and the smaller quadrupeds, and is frequently discovered by its loud cry or [illegible], resembling the word *Wha*, often repeating the same. Hence is derived one of the local names by which it is known. It is also called the *Chitwa*.

Locality.—Himalaya chain of hills between Nepaul and the Snowy Mountains (Hardwicke, *Linn. Trans.*, vol. xv.). In Mr. Hodgson's catalogue of the animals observed in Nepaul (*Zool. Proc.*, 1834).

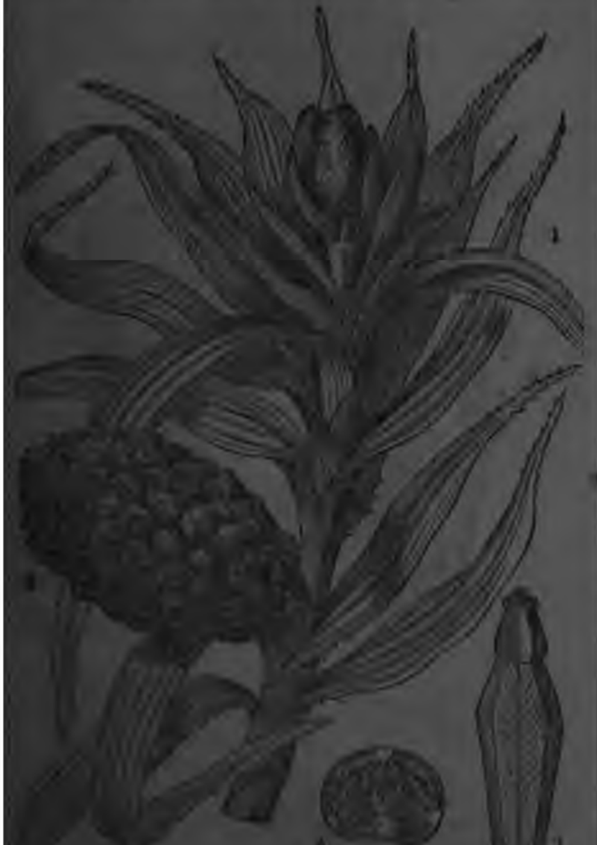
Cuvier declares the *Ailurus* to be one of the most beautiful of quadrupeds.

Ailurus fulgens. (F. Cuvier.)

Place in the System.—Cuvier places *Ailurus* among the Bears, between *Procyon* (Racoon) and the Benturongs (*Arctictis*). J. E. Gray arranges it between *Gulo* (Glutton) and *Arctictis* (F. Cuv., *Paradoxurus* and *Ictides* of F. Cuv. and Valenciennes). M. Lesson follows Cuvier. Mr. Swainson ('Classification of Quadrupeds') says of it, 'Whether this animal leads to the Racoons, or whether these latter belong to the Bears, are questions which need not here be discussed; Cuvier has placed them together, and we may for the present follow his example.' In the arrangement (Part iii. of this vol.) the form appears to be altogether omitted.

PANDANA'CEÆ are arborescent or bushy plants, with long, rigid, sword-shaped leaves, resembling those of the pine-apple, usually arranged in a manner so obviously spiral that they are commonly called *screw-pines*. In a natural arrangement they are classed with Endogens, among which they are, more especially in the genus Pandanus, remarkable for their stems forking repeatedly. Their flowers have the sexes separate, and quite covering the spadix on which they grow. The male flowers consist of single stamens with two-celled anthers; the females of naked one-celled ovaries, with solitary ascending or numerous parietal ovules. The fruit consists of a mass of ovaries collected into a tuberculated head, and either dry and fibrous or fleshy and succulent.

These plants chiefly abound in the Mascaren islands and in the Indian Archipelago, of which they form a conspicuous feature. The species of Pandanus, Vaquois, or Screw-pines, are readily known by their spiral leaves, dichotomous habit, and the long roots emitted by the sides of their trunk for the purpose of holding it down in the loose sand among which they grow; in order to assist in which each root is furnished with a partial exfoliation of the end, which, in the form of a cup, adheres to the root, for the purpose, as is supposed, of holding water during the period that the root is passing through the dry air. The genus Freycinetia, on the contrary, is composed of plants with long scrambling or rooting stems, not branching like Pandanus, indeed seldom becoming what can be called a tree, and, when in flower, adorned with gaily coloured spathes from which the young inflorescence protrudes. It can scarcely be said that the plants of this order are of any known use to man, except as furnishing, in common with many others, a good material for thatching.



Pandanus odoratissimus.

1, Male panicle; 2, [illegible]; 3, an ovary; 4, a transverse section of the ovary, showing the parietal placentation.

PA'NDANUS, a name derived from the Malay *Pandang*, and that of a genus of plants, from which the natural family of Pandanaceæ, or Screw-Pine tribe, has derived its name, being so named from their leaves, which resemble those of the pine-apple, and are inserted spirally along the stem. The species are found in the islands of the tropical ocean, in those of Mauritius and Bourbon, as well as in the southern parts of India. One species, *P. odoratissimus*, being highly fragrant, is much esteemed in all Asiatic countries, either where it will grow or where its essence is known. It is constantly referred to by the Sanscrit poets, as may be seen in Wilson's 'Hindu Theatre,' by the name *Ketaka*, and as the *Keora* and *Ketgee* of the Hindus. The Arabs call it *Kazee*, and Avicenna describes it under the name of *Armak*. Oil impregnated with the odour of its flowers and the distilled water are highly esteemed both for their odour and their medicinal use as stimulants. Dr. Roxburgh states that it is the tender white leaves of the flowers, chiefly those of the male, which yield the very delightful fragrance for which this plant is so celebrated. This species is common in the peninsula of India, where it is called Caldera Bush; in Mauritius it, as well as other species, is known as the Vaquois Plant; in Otaheite, a species is called the Wharra Tree, being in all highly esteemed for its odour, as well as for the useful purposes to which it may be applied. The lower pulpy part of the drupes is sometimes eaten, as is also the terminal bud, like that of the cabbage-palm, and likewise the tender white base of the leaves, either raw or boiled, during times of scarcity. It forms an excellent hedge, but occupies too much space. The roots are composed of tough fibres, which are used by basket-makers to tie their work, and are soft enough to be employed as corks. The leaves are composed of tough longitudinal fibres, white and glossy, a quality which adapts them for covering huts, making matting, as well as for cordage in the South Sea islands, and in the Mauritius for making sacks for their coffee, sugar, and grain.

PANDECT. [JUSTINIAN'S LEGISLATION.]

PANDI'ON. [BALD BUZZARD.]

PANDO'RA (Malacology). [PYLORIDEANS.]

PANDUS. [MAHABHARATAM.]

PANEGYRIC (from the Greek 'panegyricus,' πανηγυρικὸς λόγος) is a species of oration in praise of a person or thing, so called because such discourses used to be delivered in ancient Greece on the occasion of great public festivals before the whole assembly, 'panégyris,' of the people. The orator began by praising the deity who presided over the festival, such as Jupiter in the Olympic Games and Apollo in the Pythian; he then spoke in praise of the community or town in which the games were held, and lastly of the magistrates, the champions, and especially the victors who gained the prizes. Afterwards the name came to be applied to political orations delivered in the senate or council of a state in praise of that state or of the leading men or man in it. The panegyrical oration of Isocrates is a fine specimen of the kind, in which he commemorates the glories of Athens, the services which it had rendered to Greece in general, and the whole with a view to nourish friendly feelings between it and the other Greek states, The Panathenaic oration of Isocrates is another composition of the same class.

Under the Roman empire panegyrics were composed in praise of the emperors. Pliny's panegyric of Trajan is a well known specimen of this kind. Panegyrics became frequent under the late emperors, both of the East and the West, in Greek and in Latin; they are mostly however written in a fulsome and adulatory style. We have panegyrics of Constantine, Constantius, Justinian, Theodosius, and others, which, if consulted with discrimination, may be useful for historical purposes and for supplying deficiencies in the historians of those times. Eunodius, bishop of Pavia, wrote a panegyric in praise of Theodoric.

Panegyrics have also been written in verse. The poem of Tibullus in praise of Messala is a specimen of this kind, as well as similar compositions by Claudianus, Sidonius, and others.

In modern times panegyrics have been written by Roman Catholic preachers in honour of particular saints. Giordani, an Italian contemporary author, wrote a panegyric in praise of Napoleon, in imitation of that of Pliny. But the panegyrical style seems no longer in accordance with the taste of our age, and its essential character is too laudatory to please minds of an independent cast.

PANEL. This term in English law denotes a small schedule of paper or parchment containing the names of jurors returned by the sheriff or other ministerial officer for the trial of issues in courts of common law. The enrollment of the names upon this schedule is called *impanelling* a jury; the ministerial officer is also said to *array* the names in the panel. The etymology of the term is doubtful: Sir Edward Coke says, 'Panel is an English word, and signifieth a little part, for a *pane* is a part, and a panel is a little part' (Co. Litt., 158 b). Spelman derives the word from *pagella*, a little page, supposing the *g* to be changed to *n*. (Spelman's *Gloss.*, tit. 'Panella'). Both these etymologies seem to be incorrect. In the old book called 'Les Termes de la Ley,' *panel* is said to come from the French word *panne*, a skin; whence in barbarous Latin might come *panellus* or *panella*, signifying a little skin of parchment. This would denote the jury panel pretty accurately, and the history of its appearance as an expression in English procedure is consistent with its derivation from the French.

In the earliest records of the forms of jury-process, as given by Glanville, it appears that the sheriff was commanded by the writs in certain real actions to cause to be imbreviated (imbreviari facere) the names of the jurors by whom the land in question was viewed. But at this time the word *panel* never occurs, nor is it used by Bracton, Fleta, or Britton, nor in any statute earlier than 20 Edw. III c. 6 (1349), which forbids sheriffs from putting suspected persons in *arrays of panels*. This was precisely the period at which the French language began to be fully introduced into our law proceedings. (Luders's 'Tract on the Use of the French Language in our Antient Laws.') This coincidence renders it not improbable that the word *panel*, from *panelle* and *panne*, may have been introduced with many other French terms about this period.

In Scotch criminal law, the accused, who is called a defender till his appearance to answer a charge, is afterwards styled the *pannel*. The etymology of this word also is doubtful. (Jameson's *Dictionary*, ad verb.) But it is possible that it may have the same origin as our English word, as in Scotch proceedings a prisoner is sometimes said to be *entered in pannel* to stand trial. (Arnot's *Criminal Trials*, p. 12.)

PANGOLINS, a name in common use to designate the *Scaly Ant-eaters*, said to be derived from the word *Pangoeling*, which signifies in the Javanese language, according to Seba, an animal which rolls itself into the form of a ball. The Bengalese name is *Badjarkita*, or *Reptile of stone*. These animals form the genus *Manis* of Linnæus.

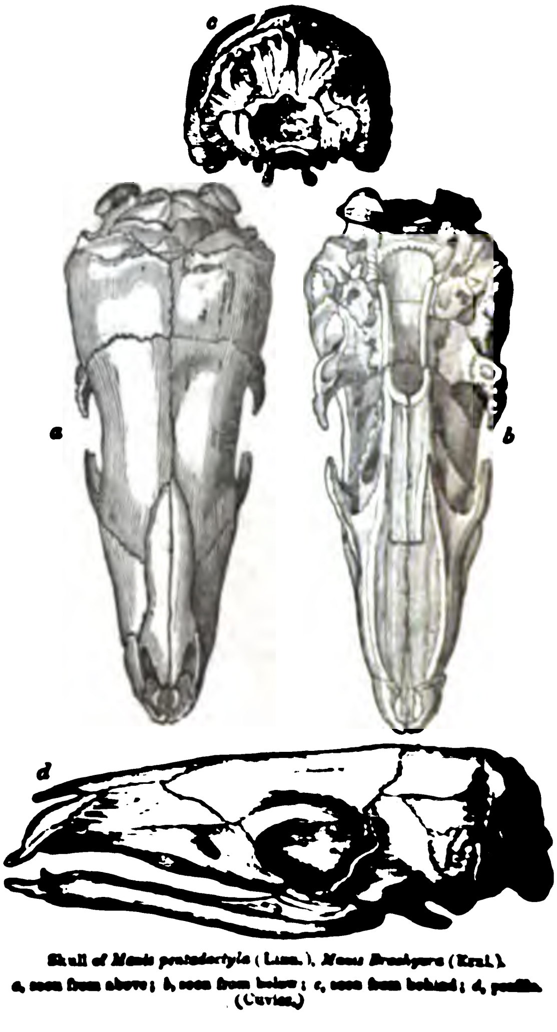
Like the *Hairy Ant eaters* (*Myrmecophaga*) [ANT-EATER; TAMANDUA], the *Pangolins* are toothless, and furnished with a very extensible tongue; but their tegumentary covering is very different, for their body, limbs, and tail are clad in a panoply consisting of great trenchant scales overlapping each other like tiles, so as to form a sort of scale-armour when the animal is on its feet. When it is vigorously attacked, and often on the first approach of danger, it rolls itself up in the shape of a ball; and then the trenchant scales are erected, and offer their sharp edges to the enemy.

Geographical Distribution.—The antient continent, &c only. Asia and Africa.

We must first call the reader's attention to those parts of the organization of this form which are most worthy of notice.

ORGANIZATION.

Skeleton.—*Skull*, a more or less elongated cone, with the base rounded. Orbits small, round, occupying nearly one-half of its length, and situated towards the lower parts of its sides: they are consequently very much separated from each other. The zygomatic arches are incomplete, and nearly on a level with the palate. The bones of the nose are notched on their inferior border, and enter above into a notch formed in the frontal bones. The articulation of these with the maxillary bones descends obliquely to the orbit, and is continued in the same direction with the palatine bone. The maxillary bone does not enter into the orbit; it terminates at the point where it gives off its zygomatic apophysis, which is short and pointed. The palatine bone itself furnishes, a little, the base of this apophysis. There is no lachrymal bone, or, if there is one, it is extremely small, and hidden in the lachrymal hole, and pierced in the angle of the orbit within, between the frontal and palatine bones. The fronto-parietal suture is hardly angular backwards, but the occipital suture forms a fairly defined angle between the posterior borders of the parietal bones. Cuvier could not detect any interparietal bone. The anterior sphenoid bone in the temple is far from reaching the parietal bone. The frontal bone is articulated with that and the temporal bone. The posterior sphenoid bone does not reach the frontal, but terminates opposite the origin of the zygomatic process of the temporal bone. In this place it contributes to the glenoid facet, which is sunk in front of the tympanic cavity. There is no jugal bone, and the temporal and maxillary zygomatic apophyses are only joined by a ligament. The tympanic cavity must be ossified at a late period only, for Cuvier never saw it except under the form of a vesicular



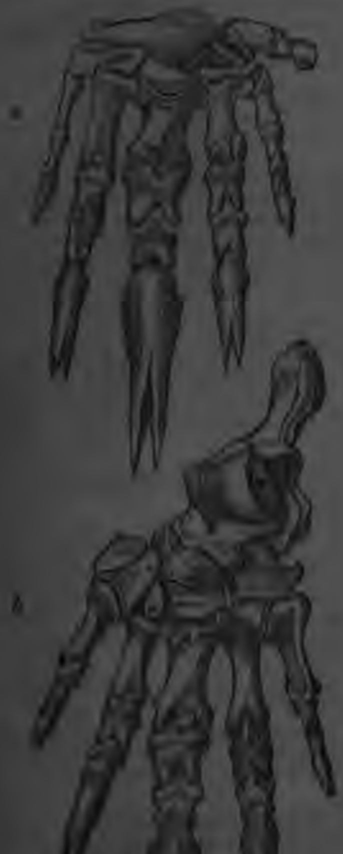
Skull of *Manis pentadactyla* (Linn.), *Manis Brachyura* (Erxl.)
a, seen from above; b, seen from below; c, seen from behind; d, profile.
(Cuvier.)

this. There is indeed a large petrous bone behind it, but only at the lower surface of the skull. Above this part the temporal bone is tumid, and contains a large cellule which communicates with the tympanic cavity by means of a hole pierced above the meatus. The intermaxillary bones are rather narrow, and rise obliquely in the half of the length of the nasal bones. Though there are no teeth the maxillary and palatine bones are raised along their sides, so that the middle of the palate forms a long channel. The palatine bones terminate obliquely opposite to the glenoid facet, and are continued from it by the pterygoid process of the sphenoidal bone, terminating in a hook within the internal side of the tympanic cavity. There is no external pterygoid apophysis; the internal one is not separated from the sphenoid bone. The suborbital hole is small, and its very short canal opens under the origin of the zygomatic arch. The lachrymal hole in the internal angle of the orbit is also large. There are in the palatine bone two holes corresponding to the spheno-palatine foramina. The anterior orbital hole is situated between the frontal and the anterior sphenoidal bone. The optic hole is moderate. The spheno-orbital is round and large. The oval is distinct, and entirely in the sphenoid. The condyloidean hole is large, but the posterior and carotid groove are small.

Internally the sella turcica is moderately elevated; the cribriform plate is very large, and divided by a very large and very bony crista-galli-like crest, separated also from the rest of the cranium by a projecting bony ring.

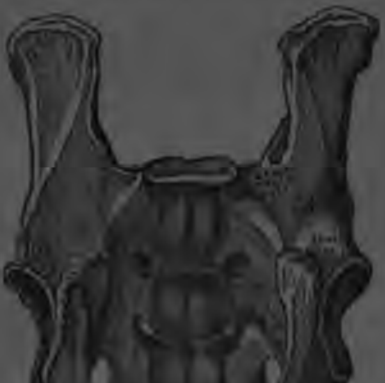
The skull of *Manis tetradactyla* (Linn.), *Manis Macroura* (Desm.), the *Phatagin* of Buffon, differs from that above described in being more slender, and also presents the singularity of having, where the lachrymal bone should be, a great oval space without any hole, which, Cuvier believes, belongs to the ethmoid bone.

Extremities.—There is a general resemblance in these portions of the skeleton in the *Hairy Ant-eaters* and the *Pangolins*; but there are particular differences, as in the scapula, &c., some of which we shall notice. Both of these groups are remarkable for the great size of the lower part of the humerus, produced especially by the projection of the internal condyle destined for the attachment for the powerful flexors which work the claws. In the *Hairy Ant-eaters* the head of the radius is nearly as round as it is in man and the Quadrumanes, having a very complete rotatory power; but it is not so in the Pangolins, which have the articulation of this part by the method termed ginglymus. The ulna and radius are both robust, and are constructed with proportions and views very different from those to be observed in the Sloths, among which they are so greatly prolonged as to be hardly fit for anything but suspension from trees. [Ai, vol. i., p. 231.] In the *Ant-eaters* they have all the strength necessary for tearing down the nests of the *Termites*, on which they feed; and, as it might be expected, the fore-feet of these quadrupeds is, next to their skull, the most remarkable part of their skeleton. The ungual phalanges of their large toes are, like those of the Sloths, so disposed as not to be capable of curvature in any other direction than downwards; and are in effect held in that position, the state of repose, by strong ligaments. In the *Pangolins* their point is forked, whilst in the *Hairy Ant-eaters* it is only furrowed, and has at its base a strong bony sheath for the insertion of the claw. In the *Pangolins* the general structure of the fore-foot is the same as in the *Hairy Ant-eaters*; but besides the differences above noticed, the scaphoid and semilunar bones of the carpus are confluent, forming a single piece, as in the Carnivora. In the Pangolins there is, too, less irregularity in the proportions of the toes, though in them, as well as in the *Hairy Ant-eaters*, the middle one is stoutest and longest.



a, Fore-foot of Pangolin; b, hind foot of the same. (Cuvier.)

The *pelvis* in all these animals exhibits the singularity of the ischium uniting with the last vertebra of the sacrum, which is furnished with apophyses for its reception, so that instead of the ischiatic notch there is a hole, which at first sight has the semblance of a second oval hole, a conformation observable in the Sloths and Armadilloes. In the *Pangolins* the os ilii, which is of a prismatic form, and terminates in front by a tuberosity, is articulated also to the last lumbar vertebra; but this is not the case among the *Hairy Ant-eaters*, where this bone is besides flatter; in both it is oblong, and not widened as in the Sloth.



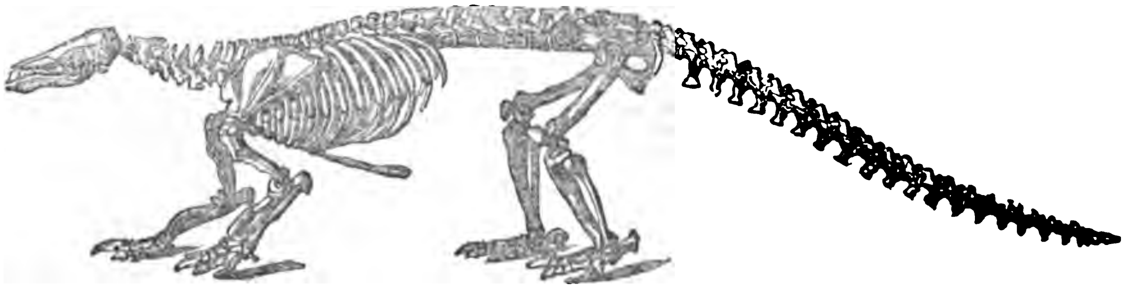
Pelvis of Pangolin. (Cuvier.)

The great trochanter is less elevated than the head of the femur; in the *Hairy Ant-eaters* there is a trenchant crest the whole length of the external edge of the bone; and in the *Pangolins* the whole bone is wide and flat from before backwards, but there is no third trochanter. The lower head of the bone is as wide as it is long, and the rotular pulley is wide but not deep. The tibia and fibula are very distinct; the former is very complete towards the lower part; the latter is rounded in front; its lower head is wider than it is long, and becomes a convex pulley (not projecting much) in its middle part. The astragalus forms sponds to this in the form of its upper head, the lower only corresponds to the scaphoïd bone, and is concave, as it is in the Sloths, which is remarkable; but the articulation of the astragalus with the tibia has none of that singular obliquity observable in those animals. The hind-foot of the *Hairy Ant-eaters* and the *Pangolins* is as solid as that of any animal. The calcaneum is compressed at its posterior apophysis, and is united to the astragalus as in most animals. In the tarsus there is a scaphoïd bone, which is convex on the anterior side of its articulation with the astragalus, but curving behind that bone; a cuboïd longer than it is wide; three cuneiform bones, the internal of which is double that of the others; and a supernumerary bone articulated on this internal cuneiform bone, and which in the *Tamanoir*, *Tamandua*, and the *Pangolins* is triangular and very small, but in the *Little Ant-eater* is elongated and widened so as to form a sort of heel. This species of calcaneum, it is true, is very short, not going farther backwards than the astragalus itself. It is this supernumerary bone which gives to the sole of the foot of the *Little Ant-eater* that concave form which renders it so fit for grasping branches and climbing trees.

Bones of the Trunk.—The Pangolins are remarkable for the strength of their caudal vertebræ, and for the extended width of their transverse apophyses: there are forty-seven in the tail of *Manis macroura*, and only twenty-six in that of the *Short-tailed Pangolin*, which has three sacral, six lumbar, fifteen dorsal, and seven cervical vertebræ: in the *Phatagin* Cuvier found only thirteen dorsal and five lumbar vertebræ. The spiny apophyses of the back and loins of these two animals are square, as in the *Tamanoir*.

The ribs of the *Tamanoir* and the *Ant-eater* (Fourmilier) are remarkable for their size; those of the latter often cover each other like the portions of certain cuirasses. There are sixteen in the *Tamanoirs*, ten of which are true, seventeen in the *Tamandua*, eleven of which are true; and fifteen in the *Ant-eater* (Fourmilier), nine of which are true. This last is also the number in the Pangolin, which has besides a slight vestige of a sixteenth, but in the *Phatagin* Cuvier found but thirteen. The sternum of the *Tamanoir* and *Tamandua* is very remarkable on account of a double body, which each of the bones possesses, a cylindrical part within the breast, and an external compressed part. The cartilages of the ribs, which are ossified, have at their sternal extremity two heads separated by a notch, and which articulate with these two parts, and always between two sternal bones. Each of these last leaves between it and its neighbour in the skeleton a vacant space, which traverses the sternum from right to left. The first of these sternal bones is very much widened and notched in front; the last is nearly rectangular. In the *Little Ant-eater* this last is cylindrical.

The Pangolins have the bones flat, eight in number, of which the three penultimate are placed transversely, and the last of all, which is very long, cylindrical, and forked in the *Pangolin* (flattened in the *Short-tailed Pangolin*), terminates in two strong tendons, which, in the latter, reach to the pelvis, and greatly assist the animals in rolling themselves into a ball.



Skeleton of Short-tailed Pangolin. (Cuvier.)

Generic Character.—Lower jaw very small; tongue very extensible. Body and tail entirely covered above with large triangular trenchant scales disposed quincuncially, and overlapping each other like tiles. Toes five, armed with robust claws. Body endowed with the faculty of rolling itself up more or less into the form of a ball.

Dental formula: — 0.

Habits, Food, &c.—The Pangolins are slow in motion, and live on worms and insects, especially termites and ants, which they seize by means of their extensible and glutinous tongue.

Asiatic Pangolins.

Manis pentadactyla, Indian, Broad-tailed, or *Short-tailed Manis, Manis brachyura* of Erxleben, and probably the *Phattage* of Ælian (xvi. 6).

Description.—Head small, pointed, and conic; muzzle elongated and narrow; body rather stout; tail short and very broad at its base; dorsal scales disposed in longitudinal rows to the number of eleven; under part of the body, head, and feet naked; some long fair-coloured hairs spring from under the scales. Middle claw of the forefeet far exceeding the others in its proportions.

Locality, Food, &c.—The East Indies, coast of Tranquebar, &c. Feeds much on termites, or white ants, for the destruction of whose conical nests the great middle claw is admirably adapted. Thunberg states that it is found much in Ceylon, especially near Negumbo. The Dutch call it the *Negumbo Devil*, and the Cingalese *Caballe*. Its flesh was given to the sick to eat by way of remedy. Thunberg further informs us that the inhabitants have a method of making a hole in its skin with a knife, and thus of guiding and governing the animal at their pleasure, the point of the knife, which is kept in the hole, goading and irritating him. The cruelty of this proceeding does not however seem to have struck the traveller. The *Land Carp* is also an Asiatic name for this species. It is the *Kuwlee Manjar*, or *Tiled Cat* of the Muhrattas, according to Colonel Sykes, who notices it as very common in Dukhun (Deccan), and living on white ants. Mr. Hodgson, in his catalogue of the quadrupeds of Nepâl, mentions a new species of *Manis* allied to *Manis Javanica*, Desm., as being of frequent occurrence in the hills of the lower region, and in the mountains of the central tract. (*Zool. Proc.*, 1830, 1831, and 1834.)

African Pangolins.

The *Phatagin* of Buffon appears to be the *Long-tailed Pangolin* (*Manis tetradactyla*, Linn.; *Manis macroura*, Erxleb.). This species is from two to three feet in length, and the tail is twice as long as the body; the scales are pointed.

Locality.—Senegal, Guinea, &c.

But we shall illustrate the African Pangolins by the *Manis Temminckii* (Smuts).

Mr. Bennett described this species from a specimen in the collection made by Mr. Steedman in South Africa; and he stated that his object in calling the attention of the Society to it was to point out the external characteristics of a species known to its original describers by its skeleton alone and a few detached scales; and he characterised it as

Manis with a rather short head, a rather wide body; the scales large, and in eleven rows; the tail as long as the trunk, rather less than that in width, and hardly narrower at the subtruncate apex. Length 25¼ inches; of the tail 12 inches; width of the back 8 inches; of the tail near the apex 5 inches.

Mr. Bennett observes that the most remarkable features of this animal are the shortness of the head, the breadth of the body, and the breadth of the tail, which is nearly equal to that of the body, and continues throughout the greater part of its extent of nearly the same width, tapering only slightly towards the end, where it is rounded and almost truncate. Mr. Bennett further remarks that a peculiarity in the distribution of the scales of *Manis Temminckii* is the cessation of the middle series of them at a short distance acticular to the extremity of the tail, so that the last four transverse rows consist of four scales each, each of the preceding rows having five. (*Zool. Proc.*, 1834.)

Dr. Smith describes it as having the scales pale yellowish-brown, the colour lightest towards their points, many of which are marked with a longitudinal yellow streak; parts not covered with scales, dusky brownish-yellow. Eyes reddish brown; muzzle black. Nails of the fore-feet a pale dull yellow; those of the hinder ones brownish yellow.

The same author points out that *Manis Temminckii* is easily to be distinguished from any of the other species yet described, simply from the central row of scales upon the upper surface of the tail terminating some way behind its point. From *Manis pentadactyla*, Lin., the species to which it bears most similarity, it is moreover to be distinguished by all its scales being proportionally larger, and by those on the head being shaped and disposed differently. The greater breadth of the tail and the more divergent direction of its marginal plates, also afford marked characters by which the species is easily to be recognised from *Manis pentadactyla*.

Locality.—Mr. Bennett gives Latakoo. Dr. Smith says that only one solitary specimen of this species was obtained by the Expedition before reaching 26° S. lat., and but two more between that parallel and the tropic of Capricorn, though others were known to have been captured in the latter tract, while the travellers were actually traversing it. He thinks it very questionable if the animal be so rare in nature as the result of their experience might incline men to believe. He is of opinion that its extreme scarcity probably arises from its having long been zealously sought after by the natives, who cherish a belief that it either has some influence upon cattle, or, at least, that certain observances in respect of it have an effect upon them. Whenever a specimen is secured it is submitted to the fire in some cattle-pen, apparently as a burnt offering, for the increase of the health and fertility of all cattle which may afterwards enter that fold. Dr. Smith states, that not many years ago a specimen was captured in the northern part of the Cape colony, which renders it probable that the species was, at one time, scattered over the whole of South Africa, and that its almost total disappearance from the more southern districts has arisen from causes such as are now operating to effect a similar result in the interior. Here we have another cause for the obliteration of a species. Intolerance of their aggressions has wrought up the shepherd or the agriculturist to the destruction of some; but, in this case, a species is probably dying out under the influence of a superstition.

Habits, Food, &c.—Dr. Smith relates that when *Manis Temminckii* is discovered, it never attempts to escape, but instantly rolls itself up into a globular form, taking especial care of its head, which is the only part that is easily injured. Ants constitute its chief and favourite food, and these it secures by extending its projectile tongue into holes which may exist in the habitations of these insects or which it may itself form; and when, by means of the glutinous matter with which its tongue is covered, a full load has been procured, a sudden retraction of the retractor muscles carries both into its mouth, after which the ants are immediately swallowed. (*Illustrations of the Zoology of South Africa.*)

Manis Temminckii (from Smith).

FOSSIL PANGOLINS

M. Schleiermacher called the attention of Cuvier to a bone of which he sent the great French zoologist a plaster-cast. This bone had been found (together with many unusual remains of *Rhinoceros*, *Mastodon*, *Hippopotamus*, and *Tapir* near Eppelsheim, in the canton of Alzey, in that part of the ancient Palatinate belonging to the grand-duke of Hesse) in a dike whence sand and gravel were dug, which seemed to have been accumulated by the alluvium of the Rhine. Cuvier was soon satisfied that this bone was the ungueal phalanx of an Edentate mammiferous quadruped, and came to the conclusion, which has not been disputed, but on the contrary entertained by many less qualified to judge, that it belonged probably to a Pangolin of gigantic stature. Taking this ungueal bone for his basis, with far less material than he had for his opinion who ventured to pronounce 'ex pede Herculem,' Cuvier measured the animal to which it must have belonged as having extended to the length of twenty-four feet. Nor will this inordinate length stagger those who know the enormous proportions which characterised some of the extinct Saurians.

Geological Position.—Tertiary. Miocene of Lyell.

PANGUTARAN. [SULU ARCHIPELAGO.]

PANICLE is a kind of inflorescence, or arrangement of flowers, in which the axis is divided into a number of lateral branches, each of which is again subdivided into other branchlets. Examples of it will be found in the Lilac, the Agrostis stolonifera, and the Horse-chesnut.

PA'NICUM, a genus of grasses the name of which is applied to one of the species (Millet) by the Romans, and which, Pliny states, is so called from its flowers being in a panicle; though others derive the name from *panis*, bread, from its uses as such. The genus contains a very large number of species, which abound in the hot parts of the world, though a few extend to higher latitudes and ascend the cool mountains of hot countries. They are chiefly valuable as pasture grasses, and for their seeds, which form a large portion of the food of the poorer classes of many nations, and thus engage a considerable share of the attention of the agriculturists of those countries.

The genus Panicum is distinguished by having a two-flowered spikelet, with the lower flower masculine or *neuter*, and the upper hermaphrodite. Glumes two, unequal, concave, blunt. *Masc.* Paleæ two, stamens three, sometimes neuter, the upper palea and the stamens abortive. Fertile flowers, paleæ two, unequal, concave, the lower one embracing the upper. Scales two. Stamens three. Styles two, ovary sessile.

P. miliaceum, or Millet, is the best known species, being cultivated in the south of Europe as well as in tropical countries. Two varieties are well known, one brown, the other yellow-coloured, imported from the Mediterranean, chiefly for feeding poultry, but forming in the south of Europe as well as in India a portion of the food of the inhabitants. In the latter country it is cultivated in the cold weather with wheat and barley, and the only one of the small grains that is so at that season of the year. It is the *cheena* of the Hindus, Arab *dukhun*, Persian *arzun*. *P. Miliare* is another species generally cultivated on an elevated rich soil in the peninsula of India; the seed is one of the sorts of dry or small grain which forms an article of diet of the Hindus who inhabit the higher lands, and cattle are fond of the straw.

P. frumentaceum, which is the *shama* and *sawank* of the natives of India, is a wholesome and nourishing grain, and forms there an article of diet chiefly of the lower classes. There are several varieties of it, which yield from 50 to 80 fold; it delights in a light, tolerably dry, rich soil; the same ground yields two crops between the first of the rains in June, July, and the end of January, in the Circars, but only one crop in the northern provinces. Besides these, which are the most commonly cultivated species, the grains of other species of Panicum growing in a wild state are collected, and form articles of diet with the poorer classes of the natives of India, as of *P. floridum* (*burlee*), *P. Helopus* (*hoorre*), *P. hispidulum* (*dhand*).

The uses of this genus are not confined to its grain, for the herbaceous part of several species forms the most valuable pasture grasses of the hot countries both in the old and new world. Some of the species of Panicum of the Brazils are of gigantic stature, and yet tender and delicate in their herbage. The Capim de Angola of Brazil grows 6 or 7 feet high, and other equally gigantic species constitute the field crops on the banks of the Amazon; while *P. maximum*, or Guinea grass, forms the most valuable pasture for cattle in Jamaica. This is said to have been introduced into that island from the coast of Africa, the seeds having been transmitted as food for some birds which were sent to Chief Justice Ellis. The straw of several of the species is esteemed as fodder for cattle in India, but no pasture grass in any country is probably more highly thought of than the *Doob* of India, which by the Brahmins is held sacred to Ganesha (Janus?) under the name of *doorwal*. This is fortunately the most common species throughout India, and forms probably three-fourths of the food of their horses and cows. It is seldom cultivated, but Europeans in the northern parts frequently form lawns by planting small pieces of this grass, which forms excellent hay. The usual mode of obtaining it is to send out the grass-cutters into the uncultivated parts of the country, who scrape off the ground the creeping stems and leaves of this species, which is easily distinguished by its smooth and creeping habit; its spikes being fascicled and digitate, filiform, from one to two inches long, with the flowers disposed in two rows on the under side. It is the *Panicum Dactylon* of botanists, and occurs also in England.

PÂNINI, the most celebrated of the Sanscrit grammarians, is said to have been the grandson of the inspired legislator Dêvala, and lived at so remote an age that he is reckoned among the fabulous sages mentioned in the *Purânas*. (See Colebrooke, *Asiat. Res.*, vii., p. 202.) With regard to his death we have the following tradition in the *Hitôpadêça*:—'It is related that the valuable life of Pânini was destroyed by a lion.' The Indians consider him as their most antient grammarian, but his great work is confessedly derived from earlier treatises on the same subject; he often quotes his predecessors Sâcalya, Gârgya, and others; and it appears from a passage in the *Bhagavad-Gita*, that the nomenclature of grammar existed when the great epic poem, the *Mahâ-Bhârata*, was composed, unless the following line is an interpolation of a later age: *aksharânâm-a-kâras asmi; dvandvas sâmâsikasya-cha*, 'I am the A of letters,' says Chrishna, 'and the copula which connects the elements of the compound word.' (*Bhag. Git.*, x. 33.)

Pânini's grammar consists of 3996 short aphorisms, or *sutras*, divided into eight books, in which the rules of grammar are delivered with such oracular brevity and obscurity that they need a commentary to render them intelligible even to the learned Indians. Besides the *Câricâ* of Bhartrihari, a brother of king Vicramâditya [AMARA], there were the following treatises, written expressly to illustrate it: 1, the *Bhattikâvya*, which was nominally a poem describing the adventures of Râma, but really a collection of all the defective and anomalous forms of words in the language, published at Calcutta, 1826; 2, the *Mahâ-Bhâshya*, or 'great commentary,' by Patanjali.

A new edition of Pânini is in the course of publication in Germany, with the following title: 'Pânini's acht Bücher grammatischer Regeln; herausgegeben und erläutert von Dr. Otto Böhtlingk,' Bonn, 1839. The first volume, which is all that is published as yet, contains the Sanscrit text of Pânini's *Sûtras* with the native scholia; the second volume is to contain an introduction, a German commentary, and indexes.

PANI'NI, PAOLO, an eminent painter of architecture, was born at Piacenza (Placentia), in the year 1691. When prosecuting his studies at Rome, he took peculiar pleasure in designing every vestige of antient magnificence, the ruins of the finest Roman edifices, and some of those buildings which are still the ornaments of modern Rome. He formed his style of composition and his entire manner after the works of Ghidolfi, in which he was so successful that he soon excelled all his contemporaries in that department of the art. His paintings are universally esteemed for the grandeur of the architecture, the correctness of the perspective, and the clearness of the colouring. His figures also are designed with taste, and cleverly grouped. In general however his figures are rather too large for the buildings, which detracts from the grandeur of the composition, and is quite contrary to the practice of Ghidolfi. In his latter time his works were distinguished by freedom and breadth of touch, but in colouring and effect they are more feeble than his earlier performances.

There are several pictures by Panini at Rivoli, a country-house belonging to the king of Sardinia, representing views of that seat and the environs.

PANIO'NIUM. [IONIA.]

PANJAB. [HINDUSTAN, vol. xii., p. 220.]

PANNAH. [HINDUSTAN, p. 215.]

PANNO'NIA, the name of a province of the Roman empire, was bounded on the north and east by the Danube, on the south by Illyricum and Mœsia, and on the west by Noricum. It was separated from Mœsia by the Savus (Save), and from Illyricum by an imaginary line drawn a few miles south of the Save; but it is difficult to determine the boundaries between Noricum and Pannonia, as they differed at various times. Under the early times of the Roman empire Pannonia could not have extended much farther west than the Narabo or Arrabo (Raab), if Pliny (iii. 27) is correct in placing Sabaria in Noricum; but in later times the two provinces appear to have been separated by Mount Cetius (Kahlenberg). Pannonia would thus correspond to Sclavonia, parts of Hungary, Lower Austria, Styria, Croatia, and to those parts of Turkish Croatia, Bosnia, and Servia which immediately touch upon the Save.

The Pannonians are called Pæones by some of the Greek writers, but this appears to have been clearly a mistake arising from the similarity of the names. The Pæones were probably a Thracian people; while the Pannonians belonged to the Celtic, or perhaps the Germanic race. They were first attacked by Augustus, B.C. 35 (Dion Cass., xlix. 36, 37; Liv., *Ep.*, 131), and were subdued during his reign by Tiberius, and reduced to the form of a province. (Vell. Pat., ii. 110, et seq.) Pannonia is not mentioned by name in the division of the Roman empire made by Augustus, but it was probably included among the Eparchies of the Cæsar. (Strabo, p. 840.) We learn from Tacitus (*Ann.*, i. 16), that at the death of Augustus there were several legions stationed in Pannonia, which was then regarded, and continued to be so till the end of the Roman empire, as one of the most important provinces of the empire, on account of its bordering on the powerful nations of the Quadi and Iazyges.

Under the early Roman emperors Pannonia only formed one province; it was afterwards divided, but at what time is uncertain, into two provinces, Pannonia Superior and Pannonia Inferior, the former comprising the western, and the latter the eastern part of the original province. They were separated from one another by a line drawn from the point at which the Arrabo flows into the Danube, southward to the Save. A new division of the provinces was made by the emperor Galerius. The southern part of the two former provinces, comprising the country between the Drave and the Save, was formed into a new province, and called Savia, or Pannonia Secunda; but the northern part was still divided into two provinces as before; the western part retained the name of Pannonia Superior, or Pannonia Prima, but the name of the eastern province was changed into that of Valeria, in honour of the wife of Valerius, who cleared a great portion of the land in the north of Pannonia of its woods, and connected the lake of Peiso or Pelso (Neusiedler See) with the Danube by a canal. (Aurel. Vict., *De Cæsar.*, c. 40.) Pannonia was thus divided into three provinces, which division appears to have continued till the downfal of the Roman empire.

The principal rivers of Pannonia were the Narabo or Arrabo (Raab), the Dravus (Drave), and Savus (Save), all of which flow into the Danube. The two most important ranges of mountains were the Pannonii Montes, a continuation of the Sarmatian range, which passed through the northern part of the province in a south-westerly direction, and joined Mount Cetius; and the Claudii Montes, which separated the valleys of the Drave and the Save.

Very little is known of the position of the different tribes which inhabited Pannonia. According to Strabo (vii., p. 314), their names were the Breuci, Andizetii, Dasnones, Diasiones, Purusti, Mazæi, and Dæsitiatæ. Pliny (iii. 28) has given a list of the Pannonian tribes, of which, he says, the principal were the Serretes, Serrapilli, Iasi, Andizetes, Colapiani, and Breuci, the first four of which he places in the neighbourhood of the Drave, and the last two in that of the Save. The powerful nation of the Boii dwelt in the north-western part of the province; and after their extermination by the Getæ that part of the province was called Deserta Boiorum. (Plin., iii. 27.) The Scordisci and Taurisci, who also dwelt in Mœsia and Noricum [NORICUM] respectively, are said by Pliny (iii. 28) to have been separated from one another by the Mons Claudius, though he does not mention them in his enumeration of the tribes which inhabited the province.

Pannonia possessed several towns of importance, the inhabitants of which appear to have principally depended for their support upon the numerous legions which were quartered in different parts of the province. Following the course of the Danube, the first town we come to after leaving Noricum is Vindobona (Vienna), called Vianiomina by Pliny (iii. 27), who places it in Noricum. At the time of Ptolemy it was called Juliobona, and was the station of a legion. It is called by most later writers Vindobona; but in the 'Notitia Imperii' it is written Vindomana. The only town of importance below Vindobona on the Danube is Carnuntum, which, in the early part of the Roman empire, was the most important place in the north of Pannonia. It is mentioned by Velleius Paterculus (ii. 109) and Pliny (xxxvii. 11, sec. 2). It appears from the account of Pliny to have been a place of considerable commercial importance. The amber which was collected in the northern part of Europe was brought to this town, and thence conveyed to the different parts of the Roman empire. It was the head-quarters of the army of Marcus Antoninus in the war which he carried on with the Marcomanni (Eutrop., viii. 6.) In the time of Ammianus Marcellinus (xxx. 5) that is, in the latter part of the fourth century, it was almost without any population. Its ruins are in the neighbourhood of Altenburg. We learn from an inscription found in this spot that it was a municipium ('Probus Devotus Municipi Carnuntensis').

Below Carnuntum on the Danube was Brigetium or Bregetium (Szöny), called by Ammianus Marcellinus (xxx. 5) Bregetio, the station of a Roman legion, where the emperor Valentinian died, while making preparations for a war against the Quadi. Following the course of the Danube, we next come to Aquincum or Acincum (Buda or Ofen), the principal town in the province of Valeria and the station of a legion. The Romans had a military station on the other side of the river, which was called Contra Aquincum. South of Acincum on the Danube, in the province of Savia, was Malata or Milata, afterwards called Bononia (Amm. Marc., xxi. 9; xxxi. 11); and below it were Acumincum or Acimincum (Peterwardein) and Taurunum (Semlin), the most easterly town in the province, near the confluence of the Save and the Danube.

The most important towns in the southern part of the province were Siscia (Sissek), Cibalæ or Cibalis (Palanka), and Sirmium (Sabacz), all on the Save. Siscia, which was upon the borders of Illyricum, was the most important town in Pannonia in the time of Augustus. It is called Segestica by Strabo (vii. 313), but Pliny (iii. 28) gives this name to an island near Siscia, which is formed at the confluence of the Colapis and the Save. Dio (xlix. 37) also calls the town Siscia. We learn from Pliny that it was a colony. Cibalæ or Cibalis was situated at a considerable distance below Siscia. It was memorable for the defeat of Licinianus by Constantine, and was the birth-place of the emperor Gratianus. (Amm. Marcell., xxx. 24.) Sirmium, which was below Cibalæ, was, under the later Roman emperors, the principal town of Pannonia. It formerly belonged to the Scordisci, and is mentioned by Strabo (vii. 314) and Pliny (iii. 28), the latter of whom states that it was situated at the confluence of the Savus and Bacuntius. It was the residence of the Roman emperors when they visited the province; and we learn from Ammianus Marcellinus (xxi. 10) that there was an imperial palace in the town.

On the Drave, near the confines of Noricum, was Petovio or Pætovio (Pettau), which is mentioned by Tacitus (*Hist.*, iii. 1) as the winter-quarters of the thirteenth legion. Below Pætovio on the Drave, were Jovia ([illegible]), and Mursia (Essek), a colony founded by Hadrian. (Steph. Byz.) At Mursa the fleet of the Lower Danube was stationed, and near it Magnentius was defeated by Constantius. (Zosimus, ii. 43.)

The only town of importance in the north-western part of the province was Sabaria (Steinamanger), a Roman colony founded by the emperor Claudius. (Plin., iii. 27.)

PANOPTICON. [BENTHAM; PRISON.]

PANORAMA (from the Greek word πᾶν, all, and ὅραμα, a view), a picture showing a view completely around the spectator. This ingenious pictorial contrivance was first devised by an English artist, Robert Barker, about the year 1788, and is not so much a new mode of painting—the process itself being similar to scene-painting or *in distemper*—as a novel application of it. Contrary to the diorama [DIORAMA], the panorama forms the surface of a hollow cylinder, or rotunda (whence it is frequently called in German *Rundgemälde* or *Rundbild*,—cyclorama), in the centre of which is a detached circular platform for the spectators, covered overhead to conceal the skylight, and thereby increase the illusion and give greater effect to the painting itself. This latter is not painted on the walls, but upon canvas, like the scenes of a theatre, and afterwards fixed up, in order that the views may be changed, and a fresh one may be in progress while another is open for exhibition. Yet although there is nothing whatever particular in regard to the execution or process of such pictures, they are attended with difficulties which can be mastered only by practice and experience. The first of these arises from the circumstance that the artist cannot either concentrate his light or adapt the direction of it arbitrarily as best suits his purpose, but while portions of his view will be entirely in sunshine, the opposite one will be almost a mass of shadow; the second is the difficulty of representing on a curved surface the straight horizontal lines of buildings; the third and greatest of all is, that there can be no single fixed point of sight, since the eye traverses around the whole circle of the horizon. Hence it might be supposed that many parts of such a picture would appear, if not quite distorted, more or less out of perspective. Yet such is not the case, no doubt partly because the eye accommodates itself to certain principal points fixed upon by the artist as centres of vision, and on account of the optical fascination attending the whole. The subjects generally chosen are views of cities, or interesting sites, whose entire locality and buildings may thus be vividly placed before the eye in a manner no less instructive than it is interesting.

One of the largest panoramas hitherto attempted is the view of London, at the Colosseum in the Regent's Park, as seen from the top of St Paul's, whose dome and western towers the spectator sees beneath and before him; and so far the deception is exceedingly well managed, but owing to the very great height of the painting, the lower part of it is not sufficiently lighted. In fact there is still room for considerable improvement as regards the mode of showing such views, since nothing would be easier than to get rid of what is now suffered to interfere with the illusion. The staircase should invariably be made to ascend to the very centre of the platform, and the latter should be made to represent a circular temple with columns supporting its roof, and placed upon a parapet of such height and breadth that the spectator could not look down, clear over it, to see the lower termination of the painting. Or perhaps a circular or octagonal room with large arched window-like openings on its sides would be still better, since the platform would thus be comparatively dark, while the picture as seen through the openings would acquire great brilliancy, and the illusion of the whole be greatly heightened.

PANORMUS. [PALERMO.]

Coin of Panormus.

British Museum. Actual size.

PANSA. [ANTONIUS.]

PANSY, a corruption of the French word *pensée*, is a name now chiefly applied to the garden varieties of Viola tricolor, Altaica, and others, which are commonly cultivated under the name of Heart's-ease. These plants, being all nearly allied to each other, have proved an abundant source of hybrids, which, by repeated crossing and selecting, have at length been so much improved in their appearance that it is not uncommon to meet with single flowers as large as a penny piece, although the wild blossoms of Viola tricolor will hardly cover a sixpence. When skilfully managed, they are great ornaments of the flower-beds in a garden, but they are short-lived, and require to be continually renewed by seeds or cuttings. They love damp rich soil, not too much exposed to the sun, and are thought to acquire the greatest health and beauty when planted in beds of light rich earth upon a thick substratum of cow-dung, into which their roots will quickly penetrate.

PANTELLARIA. [SICILY.]

PANTHE'ON, a very celebrated and well-preserved monument at Rome, of which Valerius of Ostia is said to have been the architect. It consists of a rotunda with a noble Corinthian octastyle portico attached to it, and resembles in its general mass the Colosseum in the Regent's Park, London, except that the body of the latter building is a polygon of sixteen sides, and its portico (a Grecian Doric hexastyle) is only a single intercolumn in depth. That the portico of the Pantheon was erected by Agrippa, the son-in-law of Augustus, is testified by the inscription on the frieze: 'M. Agrippa, L. F. Cos. Tertium Fecit.' Yet some have supposed that he merely made that addition to the previously erected rotunda. Hirt, in his 'Historico-Architectural Observations on the Pantheon,' very reasonably argues that, there being no direct proof to the contrary, the whole structure may safely be assumed to have been erected according to one original plan, because without the portico it would have been a lumpish and heavy mass. Hirt further rejects the idea of the rotunda having been originally not a temple, but an entrance to public baths; it is certain that circular plans were greatly affected by the Romans both in their temples and other buildings, on which account their architecture presents a variety that does not occur in that of Greece. Despoiled as it is of rich ornaments, gilded bronze-work, and statues, of which it was plundered before the building was consecrated as a Christian church in the seventh century,—further, disfigured by two ugly belfries erected by Urban VIII., whose family name Barberini gave rise to the memorable pasquinade, 'Quod non fecerunt barbari fecere Barberini,'—the Pantheon is still the pride of Roman architecture, and well justifies Akenside's character of it:—

> 'Mark how the dread Pantheon stands
> Amid the toys of modern hands,
> How simply, how severely great!'

It is by far the largest circular structure of antient times, the external diameter being 188 feet, and the height to the summit of the upper cornice 102, exclusive of the flat dome or calotte which makes the entire height about 148 feet. The portico (103 feet wide), as has been said, is octastyle, yet there are in all sixteen columns, viz. two at the returns, exclusive of those at the angles, and two others behind the third column from each end, dividing the portico internally into three aisles or avenues, the centre one of which is considerably the widest, and contains the great doorway within a very deep recess, while each of the others has a large semicircular tribune or recess. But although, independently of the recessed parts, the portico is only three intercolumns in depth, its flanks present the order continued in pilasters, making two additional closed intercolumns, and the projection there from the main structure about 70 feet; which circumstance produces an extraordinary air of majesty. The columns are 47 English feet high, with bases and capitals of white marble, and granite shafts, each formed out of a single piece. The interior diameter of the rotunda is 142 feet, the thickness of the wall being 23 feet through the piers, between the exhedræ, or recesses, which, including that containing the entrance, are eight in number, and each, except that facing the entrance, is divided into three intercolumns, by two columns (34·7 feet high) between antæ or angular pilasters; while the intermediate piers are occupied by eight smaller projecting tabernacles. But as, besides being repaired and altered by Septimius Severus, the interior has undergone many changes, or rather corruptions, it is hardly possible now to determine what it originally was. Hirt supposes that all the recesses were arched, and, except the one for the entrance, contained colossal statues of Roman deities, and that there were no columns in front of them, but a single insulated column on each side, with the entablature of the piers breaking over it, whereby the entire circumference was divided into sixteen equal intercolumns formed by as many columns. Yet the projection of the columns, and the breaks in the entablature, as well as the interruption of the latter by the arches, would have destroyed the unity and simplicity of the plan. Besides which the effect of the columns and narrow intercolumns in the recesses, and the effect of shadow thus obtained, would have been lost. The greatest defect of all is the tasteless and even barbarous modern decoration of the space between the cornice of the order below, and that from which the dome springs. Had this space been reduced by considerably augmenting the principal cornice, converting it into a cornicione as a finish to the cylindrical portion of the building, and the remainder been divided into oblong pannels over the recesses, filled with reliefs, there can be little doubt that the general appearance would have been materially improved, and that with greater simplicity much greater richness also would have been obtained. The dome has five rows of coffers (now stripped of their decorations) and a circular opening in the centre, 26 feet in diameter, which not only lights the interior perfectly, but in the most charming and almost magical manner. Indeed there has scarcely ever been but one opinion as to the captivating effect thus produced, and the exquisite beauty of the whole, as regards plan and general proportions. As an interior, Grecian architecture has nothing whatever, we will not say that rivals, but that even approaches it; nor does it say much for modern architects, that, with such an example before them, they should scarcely ever have taken a lesson from the Pantheon in regard to those qualities which constitute its excellence, namely, the richness of columniation and great depth of the portico, and the simple majesty of proportion and captivating distribution of light in the interior, producing an effect so greatly superior to that of any modern dome or cupola.

It was Michael Angelo's boast that he would suspend the dome of the Pantheon aloft over the centre of St. Peter's; and if he meant no more than a dome equal in magnitude to the whole interior of the Pantheon, he was right; but in every other respect his dome is totally dissimilar from it. Instead of being within a capacious rotunda of which the vaulting itself occupies one half the entire height, you look up into that of St. Peter's and most other modern ones from a great distance below, and although that sort of effect may be good of its kind, and allowable for the sake of variety, it is totally different from the other, to say nothing of the quite contrary effect of light, which, instead of diffusing itself in a brilliant stream from the summit, enters below and in all directions, so as to produce a flickering glare. In our own St. Paul's for instance, the dome exhibits within only a sort of darkness visible—a murky gloom through which may be discerned the twinkling of the lantern on its summit. Almost the only tolerably correct imitation of general character and effect of the interior of the Pantheon, is the rotunda of the museum at Berlin, by Schinkel; although not half the size, its proportions are nearly similar, with the exception that the cylindrical part is a little loftier as compared with the dome, the diameter being 66 feet, the entire height 70, and that to the top of the cornice 42. Like the Pantheon, it is lighted by a single aperture in the centre of the dome, 22 feet in diameter, and glazed with crystal-glass of enormous thickness. The Halle aux Blés at Paris deserves also to be mentioned as an instance of a rotunda resembling in its proportions the interior of the Roman Pantheon, the central area being 128 feet in diameter, and the height to the summit of the dome somewhat less. The library of the University of Virginia, which was planned by the late President Jefferson, is (externally) a copy of the Pantheon, of about one half the linear dimensions. Canova's church at Possagno is also an imitation of the Pantheon in its plan and dome: further mention is made of that and some other structures of the same kind in the article ROTUNDA.

For further particulars respecting the dimensions and construction of the dome of the Pantheon, and several modern ones, the reader is referred to DOME.

PANTHER. [LEOPARDS, vol. xiii., p. 430, et seq.]

PANTODA'CTYLUS, the generic name given by MM. Duméril and Bibron to the form known generally as *Trachydosaurus scincoides* (*Ptychopleures*).

PANTOGRAPH, sometimes improperly called **PENTAGRAPH**, is an instrument employed in copying maps, plans, and other drawings.

The annexed diagram represents that most commonly in use.

It is composed of four brass rules or bars, jointed to each other at the points B D E F. These joints require to be executed with the utmost care, as upon the smoothness and steadiness of their motion the accuracy of the instrument principally depends. In those of the best construction there is a small metal cock screwed to the lower bar of each joint, which supports the upper end of the axis upon which it turns. This is a material improvement upon the common flat compass joint, as, besides lengthening the axis, it gives additional strength to the bar where it most requires it. A joint of this construction is shown in *fig*. 2.

At the point C is fixed a small tube which carries the tracing point, so fitted as to move freely within it, but without shaking; *fig.* 3 represents the tracer within the tube.

Fig. 1.

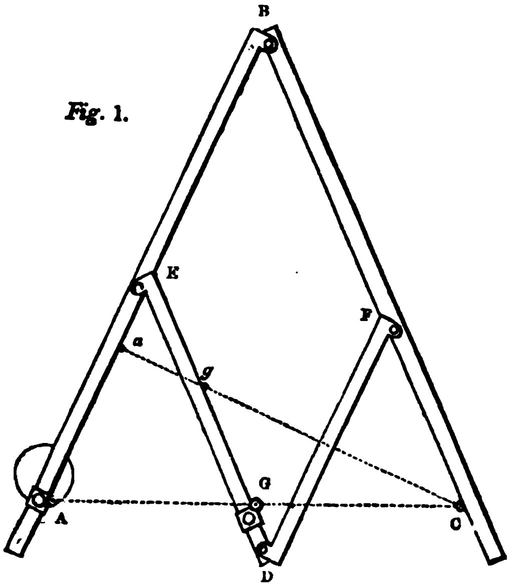
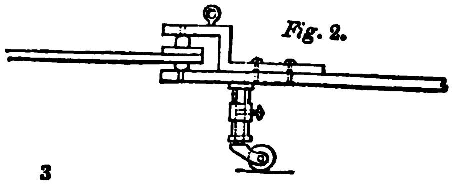


Fig. 2.



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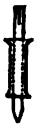

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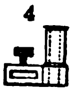

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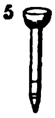

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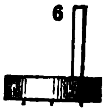


The bar E D and the lower part of the bar A B are furnished each with a tube, *fig.* 4, similar to that at C, but moveable on the bar, with a similar screw to fasten it down at any required point. *Fig.* 5 is the pencil stem, which fits either of the tubes in the same manner as the tracer; on the top of the stem is a cup to receive a small weight to keep it down upon the paper, and the lower end carries a pencil, or, which is better, a 'Mordan's point.' A silk cord is attached to the pencil stem, carried through eyes made for the purpose, over the joints E B F, one of which is shown on the top of *fig.* 2, and fixed in a notch in the top of the tracer, *fig.* 3, so that the pressure of the thumb upon the cord lifts the pencil from the paper when required. *Fig.* 6 is a flat leaden weight with a brass stem rising out of it, which fits in the tubes in the same manner as the pencil and tracing point; this is called the fulcrum, as being the point upon which the whole instrument moves; the weight has three or four fine points on its under surface to keep it from shifting upon the paper. The whole instrument is supported by six revolving feet or castors, which should move very freely in all directions. One of these castors is shown under the joint, *fig.* 2. The pin or fulcrum is placed near the edge of the weight, so as to allow room for the castor to work when the fulcrum is near the points A or D.

The proportion of the bars is of no consequence, so that E D is equal to B F and E B to F D, in which case they will always form a parallelogram, by which name the instrument is sometimes called. Now if the tracer at C is carried over the lines of the plan, the fulcrum-tube being fixed at A, and the pencil-tube at G, the pencil will make an exact copy of every line, but only half the size of the original, which may be proved in the following manner.

The points A, G, and C are capable of being brought close together, and when the instrument is open, as in the figure, G is exactly half way between C and A; C then travels twice as quickly as G in the direction A G C, so that to whatever extent the pantograph may be opened, G and C being considered as points in a lever of which A is the fulcrum, it will be seen that if C is made to describe an arc of a circle of any radius, G at the same time is describing an arc of a circle of half the radius, so that C moves in a direction perpendicular to A G C twice as fast as G. Now it was shown above that it moved twice as fast as G in the direction A G C, and as by the composition of these two motions, all lines, whether rectilinear or curved, are produced, it follows that the pencil at G will produce a copy half the size of the original traced over by the point at C, as before stated.

To produce a copy one-fourth the size of the original, we must shift the pencil from G to *g*, and the fulcrum from A to *a*, *a g* being one-fourth the length of *a* C, and so on for all other proportions *less* than half, the constant rule being —'As the distance of the pencil from the fulcrum is to the distance of the tracer from the fulcrum, so will be the size of the copy to that of the original.' No calculation is required in practice, as the arms A E and E D are graduated for all proportions from one-twelfth to eleven-twelfths inclusive. If it be required to produce a copy *more* than half the size of the original, the fulcrum must be placed on the arm E D, and the pencil on A E, the rule above given still holding good, so that for a copy the *same size* as the original the fulcrum must be placed at G, and the pencil at A. It must be borne in mind however, that when the fulcrum is on the arm E D, the copy will be inverted.

Though the principle of this instrument is as simple and complete as can be imagined, yet it falls sadly short of perfection in practice.

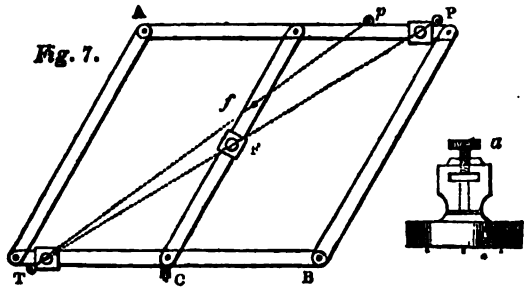
In the first place the numerous joints and castors, however carefully constructed, make it heavy to the hand in comparison with the unfettered pencil, and it requires much practice to be able to manage it so dexterously as to get those minute and gentle undulations, necessary not only to the beauty but to the utility of the drawing. The pencil too, constantly working upright, does not maintain that fine point which is required for distinctness of outline, and to these faults we must add inaccuracy of workmanship, however slight, the effect of wear, inequalities of the paper, and other accidents.

The best way to test an instrument is to reverse the position of the tracer and pencil, thus producing a copy larger than the original, when the defects will of course be exaggerated in proportion.

The pantograph however, though it cannot be depended upon for an accurate and finished copy, is of great service to the draughtsman, for by it may be marked off all the principal points through which to draw the lines of a plan with equal accuracy and infinitely greater facility than by any other means used for the purpose.

The annexed engraving represents a pantograph of very recent invention, which possesses some advantages over that before described.

Fig. 7.



In the first place, the fulcrum being in the centre, it requires but one castor, which is placed at C, and makes it work much lighter in hand than the old instrument, which has six, as before described; besides which these six castors are frequently a great source of annoyance by getting off the edge of the drawing-board and running over drawing-pins or any thing else which may happen to be in the way. Secondly, the shape of this instrument allows it to move as freely when nearly closed as when opened wide, which is not the case with the other. The simplicity of its construction renders description almost superfluous.

It is composed of six bars, moving freely about each other at the six points of juncture, so arranged with regard to length that A P and T B are always parallel to each other. F is the fulcrum, furnished with a socket and screw (*a*), through which the centre bar can be moved, and which can be fastened down at any of the graduations on that bar. This socket, with the bar, turns upon the pin rising out of the centre of the flat weight, as shown in the diagram. Now the tracer T, the fulcrum F, and the pencil P must always be in a straight line. To produce a copy the same size as the original, the fulcrum must be in the centre, and the pencil and tracer, as in the engraving, equidistant from the centres of their respective arms, and consequently from the fulcrum. For a half-size copy the pencil must be shifted half way up the arm to *p*, and the fulcrum to *f*, in the straight line T *f p*, and so on for any required proportion, which is apparent by a glance at the diagram. The rule laid down in regard to the other instrument holds good for this, the copy bearing the same proportion to the original as the distance of the pencil from the fulcrum does to that of the tracer.

In using the pantograph it is frequently necessary to copy the drawing in divisions, on account of the instrument not being large enough to extend over the whole surface at once. In this case the greatest care is requisite to join the lines of one division accurately to those of the adjoining division. The best way of effecting this is to hold the tracer down upon a point in the original by one hand, moving the fulcrum about with the other, until the pencil exactly coincides with the corresponding point in the copy. To ensure accuracy, this should be tried with three or more points, as the least deviation will throw the whole plan out of position.

In practice a large number of plans are copied of the same size as the original. The quickest method, which however requires great care, is to pin down a piece of transparent paper called tracing-paper upon the original, on which the lines are marked with a fine-pointed pencil. A piece of paper rubbed over with blacklead is then placed upon the paper intended for the copy, with the black side downwards, and the tracing-paper is pinned down upon it; the lines then are carefully traced over with a steel point, and the pressure transfers the blacklead to the drawing-paper beneath. The black paper is sometimes omitted, and the lines, traced by slight indentations only, are finished by hand, in the usual manner.

If it is required to reduce a plan, and the draughtsman does not possess a pantograph, the usual way is to divide the original and the paper for the copy, whatever the relative size, into the same number of squares, which will of course then bear the same proportion to each other as the surfaces of which they are divisions. The lines must then be set in singly, either by the assistance of the proportional compass or scale, or by a geometrical scale drawn for the occasion. The following is the best method we are acquainted with, and is dependent only upon the compass and T square.

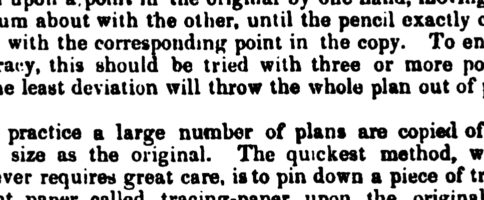


Fig. 8.

Draw a triangle in which A B is the base, and make A C bear the same proportion to C B as you wish the copy to bear to the original; take any distance on the original, and set it off from B on B C, draw a line parallel to A B, and that portion of A C cut off by such parallel will bear the required proportion to the distance set off on B C, as may be seen by the divisions 1 2 3 4 on the two sides of the triangle in the diagram. The triangle should be drawn in ink, and the distances, being marked in pencil, may be rubbed out when transferred to the paper.

PA'NTOMIME, the name of a species of dramatic performance in which the actors express themselves by gestures. The name is composed of two Greek words, meaning 'imitation of every thing.' Pantomimic acting, accompanied by music, has been in use among the Chinese, Persians, and other Oriental people from the oldest times. The Greeks introduced the pantomime in their chorusses, some of the actors dancing and gesticulating, accompanied by music, whilst others sang. (Lucian, *De Saltatione.*) The Romans had entire dramatic representations consisting of dance and gestures only, styled 'saltatio pantomimorum,' and some of their performers attained a high degree of excellence in the art. Two of them, Bathyllus and Pylades, in the time of Augustus, have been celebrated by the Roman writers.

In modern times pantomimic balls, representing an entire dramatic action or fable, have become a favourite scenic performance. The Tuscan Angiolini, in the last century, and after him Viganò, who died at Milan in 1821, have excelled in this species of composition. Noverre, in France, distinguished himself likewise in the composition of pantomimic 'ballets.' This kind of performance now forms generally an appendage to the opera, and especially the Italian opera.

Meursius, *Orchestra;* Signorelli, *Storia Critica dei Teatri antichi e moderni.*)

PAO'LA. [Calabria.]

PA'OLI, PASQUA'LE DE, was born in 1726 in the village of Rostino, in the jurisdiction of Bastia in the island of Corsica. In 1734 his father Giacinto de Paoli, together with Giaffieri, was proclaimed their leader against the Genoese by the revolted Corsicans, but after a struggle of several years, in which the adventurer Theodore figured, Giacinto was obliged by the French auxiliaries of the Genoese to give up the contest, and obtained leave in 1740 to withdraw from the island with his younger son Pasquale. [Corsica; Neuhoff.] Clemente the elder son remained in Corsica. Giacinto and his son went to Naples, where the father obtained a commission in a regiment formed chiefly of Corsican emigrants, and the son was placed in the military college of that capital, where he studied under able masters, amongst others the celebrated Genovesi. On leaving college young De Paoli obtained a lieutenant's commission in the Neapolitan service. Meantime a fresh revolt broke out in Corsica, under two chiefs, Matra and Gaffori, who gave full occupation to the Genoese for several years. In October, 1753, Gaffori was murdered by hired assassins, and the Genoese were suspected of having instigated the crime. The Corsicans now cast their eyes upon young Paoli, and invited him to come and put himself at their head. He did so, and was proclaimed, in a parliament of the representatives of the people, in July, 1755, captain-general of the Corsicans. During twelve years he baffled all the efforts of the Genoese, who lost every part of the island, except the maritime towns of Bastia, Calvi, San Fiorenzo, and Ajaccio, in which the Genoese garrisons were blockaded by the natives, and at last the Corsicans obtained possession of Ajaccio also. But Paoli had to encounter a more dangerous enemy than the Genoese, in the traitors among his own countrymen, headed by Matra, who, through jealousy or bribes, or both, excited a civil war, in which he was defeated and killed, and his brother was obliged to take refuge at Genoa. Meantime Paoli organised the island, and fixed its government and administration. He formed a legislative assembly, under the name of 'Consulta Generale,' of 500 deputies, elected by the body of the people, one for each commune the members were renewed every year; only freeholders twenty-five years old at least were qualified to be returned as deputies. The executive consisted of nine members, elected by the deputies. Paoli was the president of the executive, with the title of 'General of the Kingdom and Chief of the Supreme Magistracy of Corsica.' He had a body-guard which escorted him when he went out, to protect him against any attempt at assassination; but he would have no guard at the door of his apartments, trusting to the fidelity of six large fierce mastiffs which watched and slept in his room. A law of the legislative assembly forbade under severe penalties any person from speaking or writing against the general or the executive council. In 1764 Paoli established a university in the town Corte, the professors in which were paid by the nation, and the students taught gratuitously. The funds for the new university were supplied from a tax on the parochial clergy. The military force consisted of militia well trained to the use of arms; Paoli could collect 30,000 men in case of necessity. He also formed a flotilla, with which he annoyed the Genoese trade, and took possession of the island of Capraia. The whole public revenue of the island did not exceed one million of livres, or about 40,000 pounds sterling. In 17[illegible] Pope Clement XIII., at the request of Paoli, sent to Corsica a bishop with the title of Apostolic Visitor, in order to regulate the ecclesiastical affairs, which were in a state of confusion. This step, which had something of the appearance of a recognition of the independence of Corsica, greatly displeased the republic of Genoa, which offered a reward of 3000 crowns to any one who should arrest the bishop and deliver him over to the Genoese authorities, forbidding at the same time all subjects of the republic to obey his mandates. The pope published an edict against the resolutions of the *[illegible]* which he characterised as iniquitous and an insult to the apostolical authority. The quarrel lasted for some years, and employed the pens of jurists and controversialists on both sides.

Genoa, despairing of ever recovering the sovereignty of Corsica, resolved on giving up the island to France. This was effected by the treaty of Versailles in 1768, a dishonourable and disgraceful contract to both parties. Paoli loudly and eloquently appealed to all Europe against the cession, but no one interfered in favour of Corsica. The French landed a large force in Corsica, well provided with artillery and ammunition, under the command of Count Marbœuf. Paoli determined upon resistance, and was seconded by the whole population, including the women. The Corsicans fought desperately: though overwhelmed at first by superior forces, they defeated the French with great slaughter on the banks of the Golo, and again on the 9th October, 1768, they routed the main body of the enemy, commanded by Marbœuf in person, with the loss of two thousand men. In the following year large reinforcements came to the French from Toulon under General de Vaux. In May, 1769, a general battle took place, in which the Corsicans, after fighting bravely, were completely routed near Pontenuovo. The French entered Corte, and overran the whole island. Most of the communes submitted to the conquerors. Paoli, with many followers, retired to Portovecchio, from whence he sailed in an English vessel for Leghorn, where he was kindly received by the grand-duke Leopold. Paoli afterwards repaired to England, where he remained till 1789, when Mirabeau moved in the National Assembly the recall of all the Corsican patriots who had bravely fought for the independence of their country. Paoli repaired to Paris, where he was received with acclamations, and in the hall of the Assembly he promised fidelity to France under the new order of things. He was presented to Louis XVI., who made him lieutenant-general and military commandant in Corsica. He was received in his native island with the greatest enthusiasm, and was placed at the head of the national guard. Paoli acted faithfully towards the constitutional monarchy of France; but when the violent revolutionists overthrew that monarchy, Paoli drew back, and separated himself from the French party. His nature, sincere and steady of purpose, revolted from the injustice, the oppression, and the immorality of the Convention. He was soon accused before that assembly, and his name was placed on the lists of proscription. Paoli now saw it was high time to declare himself. He assembled his countrymen, by whom he was appointed general-in-chief and president of the council of government. At the first declaration of war between England and France, he applied to the English commanders in the Mediterranean, and, with their assistance, drove the French garrisons out of the island. Soon after, a deputation of the consulta proceeded to London to offer the crown of Corsica to the King of Great Britain. The offer was accepted, and most Corsicans expected that Paoli would have been appointed viceroy, but Sir Gilbert Elliot was named to that office. This and some subsequent disagreements made it desirable for Paoli to leave the island, in order not to give a pretence for civil dissensions. Having recommended his countrymen to remain firm in their allegiance to the British crown, as their only means of salvation, he returned to England, where he lived in retirement for several years, on a pension which the British government allowed him. He died near London, in February, 1807. A monument, with his bust and an inscription, was raised to his memory in Westminster Abbey.

The biography of Paoli has been written by Pommereul in an hostile and unfair spirit; Boswell, on the contrary, has written a kind of panegyric with his usual commonplace enthusiasm. Pompei, in his 'Etat de la Corse,' Paris, 1821, gives the best account of the particulars of Paoli's life. Botta, in his 'Storia d' Italia,' book 46, gives a copious narrative of Paoli's career in Corsica. A volume of Paoli's letters has been published, which, with his speeches and manifestoes, are his only literary remains.

PAOLO, S., or more properly S. PAULO, a town in Brazil, in 23° 33′ S. lat. and 46° 36′ W. long., about 40 miles from the coast and its harbour Santos. The town is built on a plain 2464 feet above the level of the sea, and divided from the shore by a steep descent, down which there is no carriage road, so that all the goods which are imported or exported are transported on the backs of mules. The plain of Piratininga, on which the town is built, has an undulating surface; the hills have gentle slopes, and are covered with trees, and the level tracts between them are extensive savannahs, which make excellent pasture-ground. The streets are wide, and some of them paved, and the houses have usually two floors. They are not built of bricks or stones, but of *taipa*, that is, the walls consist of two rows of posts, and the interval between is filled with earth. Some public edifices are large, as the palace of the governor, which was formerly a college of the Jesuits, that of the bishop, the convent of the Carmelites, and the cathedral and some other churches. Three bridges of stone have lately been erected over two small streams, the Tamanduatehy and Inhangabahy, which flow on the east and west of the town, and unite some distance farther down. According to a census taken in 1815, the population was 25,412, but had increased in 1820 to 30,000, and it is now stated to exceed 40,000. About one-half of the population are whites, and the other half are descendants of whites and Indian women: the latter are here called *mamelucos*. Contrary to the common practice in America, both classes of inhabitants have the same political rights, and enjoy the same consideration in society. Education is not neglected: in the college of the town the classics and philosophy are taught, and several Paulistas have been distinguished by genius and learning. Most of the inhabitants are rich landed proprietors, and occupy themselves with agriculture and the rearing of cattle. Though situated near the tropic, the elevation of the plain above the sea is too great, and its climate too cold and wet, to be favourable to the cultivation of intertropical productions. Cotton, coffee, and sugar however are cultivated to a considerable extent, though the plantations sometimes suffer from frost and protracted rains. Tobacco and maize succeed exceedingly well. All these branches of agriculture supply articles of export, to which must be added the produce of the cattle, as jerked beef, hides, horns, and tallow. They are sent to Santos, whence a great portion goes to Rio Janeiro or directly to Europe. The jerked beef goes chiefly to Pernambuco, Seara, and Maranhão; and sugar and rum are exported to Rio Grande do Sul, Monte Video, and Buenos Ayres. The imports are manufactured goods: nothing is made in the town except coarse woollen cloth for the lower classes, and very indifferent hats. Some twenty years ago government erected a manufacture of guns, in which English iron, and that of the mines of Sorocaba, situated in the province of S. Paulo, are used.

The Paulistas are distinguished, in the history of Brazil, by their enterprising spirit, and their long expeditions into the interior of South America. A small colony existed in 1527, at S. Vincente, on the coast: the inhabitants formed in 1560 a settlement at S. Paulo, which soon increased on account of the healthiness of the climate, and the friendly intercourse between the settlers and the Guayanazes, a native tribe inhabiting this country, with whom they intermarried. They soon began to explore the country farther north and west in quest of gold, and they advanced to the Laguna dos Xarayes and the present boundary-line of Bolivia. It may be said that nearly all the settlements of the Portuguese in the interior of Brazil north of 10° S. lat. owe their existence to the activity and the adventurous spirit of the Paulistas, and that but for the expeditions undertaken by them, the authority of the Portuguese would never have penetrated, as it has done, to the very centre of South America and even farther. Even when Portugal was united with Spain under one government (1580 to 1640), the Paulistas considered the Spaniards as their enemies, and checked their progress into the interior of South America by destroying their settlements on the Paraguay. They were accordingly represented by the historians of that period as living in a state of anarchy. After Portugal had re-acquired its independence, the Paulistas submitted to the viceroy of Bahia, and remained faithful subjects to the king of Portugal. They are still distinguished among the inhabitants of Brazil by their activity, spirit of enterprise, independence of character, and freedom of manners.

(Henderson's *History of Brazil*; Spix and Martius, *Reise in Brasilien*.)

PAOLO SARPI. [PAUL SARPI.]

PAPAL STATE, STATO PONTIFICIO, called also *Stato della Chiesa*, is the name given to the dominions belonging to the *See* of Rome, of which the Pope is the monarch. This state occupies the central part of Italy, stretching across the Peninsula in an oblique direction from the Mediterranean to the Adriatic. Its greatest length from north to south, from the mouth of the Po at Goro to Monte Circello, which is the most southern point, is about 260 miles: the breadth is very unequal, being about 120 miles in its southern part, along the coast of the Mediterranean, but it is hardly half that distance farther north towards the middle of its length, owing to the frontiers of Abruzzo protruding considerably to the westward. It becomes still narrower near Pesaro and Rimini, where, being straitened between the Adriatic on one side and the eastern frontier of Tuscany on the other, it is hardly 20 miles across. Farther north it becomes wider as it stretches into the plain of the Po, and it is about 50 miles, from east to west, from the Adriatic to the frontiers of Modena. The area of the Papal State has been reckoned, according to Neigebaur and other German writers, at 17,822 English square miles. Calindri (*Saggio Statistico*) reckons it at 18,117 square Roman[*] miles. Of these, 7000 square miles consist of plains, about 4000 square miles consist of cultivated hills, 4600 are highlands covered with pasture or planted with timber-trees, and 2500 are mountains mostly rocky and barren.

The Papal State consists, geographically speaking, of three great divisions: 1. The northern provinces stretch from the Tuscan Apennines to the Po and the Adriatic, the ground sloping to the north and north-east, and merging into the wide plain of Lombardy. These provinces are the four legations of Bologna, Ferrara, Ravenna, and Forli, and have a population of about 950,000 inhabitants. This part of the country resembles the rest of north Italy in its climate and soil, and belongs almost entirely to the basin of the Po. [BOLOGNA; FERRARA.] In antient times it was out of the limits of Italia Proper, and formed part of Cisalpine Gaul; and even now the inhabitants, in their character and habits, rather resemble their Lombard neighbours than their fellow-subjects of the rest of the Papal State, from whom they are divided by several offsets of the Apennines, which approach close to the Adriatic coast in the neighbourhood of Rimini, where the Rubicon constituted the political boundary of Italia Proper in the time of the Roman republic. South of this point begins the second geographical division of the Papal State. 2. This, which may be called the eastern division, extends from Rimini to the Tronto on the frontiers of Naples, a length of 110 miles along the coast of the Adriatic. It is bounded to the west and south by the central ridge of the Apennines, which separates it from the southern part of the Papal State, or the basin of the Tiber. This eastern division lies almost entirely on the eastern slope of the Apennines, the numerous offsets of which run in parallel ridges in a north-east direction from the central chain to the Adriatic coast, forming many transverse valleys watered by streams or torrents which have a short but rapid course. The distance from the central ridge or watershed to the Adriatic varies from 30 to 40 miles. The country is fertile and healthy, and is inhabited by an industrious and lively race of people. It is generally designated by the name of the Marches, and the people are called 'Marchigiani' [MARCA DI ANCONA]; but it is administratively divided into the provinces of Pesaro e Urbino, Ancona, Macerata, and Fermo e Ascoli, the united population of which amounts to about 800,000 inhabitants. 3. The third or southern division of the Papal State, the largest in extent, though not so densely peopled as the other two, is the most important, because it contains the metropolis, and includes the classical land of Latium and the other provinces which formed the early territory of antient Rome. It extends south of the central ridge of the Apennines as far as the coast of the Mediterranean, being bounded on the west by Tuscany and by the kingdom of Naples on the east. This fine region comprises the antient territories of Umbria, the Sabini, old Latium, and the western part of Etruria, and is now divided into the administrative provinces of Perugia, Spoleto e Rieti, Viterbo, Frosinone, and Rome, with a population of about 900,000 inhabitants. Its length from north to south, from the Apennines above Gubbio, the antient Iguvium, to the shore of the Mediterranean at Mount Circello, is 150 miles, and its greatest breadth, from the small river Pescia, on the boundary of Tuscany, to Terracina, on the borders of Naples, is 120 miles. This extensive country is divided, with respect to its climate and productions, into two parts—the high lands and the valleys of the Apennines, including the valley of the upper Tiber, which are well cultivated and generally healthy; and the low lands of the Campagna and some other spots around the lakes of Perugia, Bolsena, and Bracciano, which are unwholesome and thinly inhabited. [CAMPAGNA DI ROMA.] There are few regions in Italy finer than the broad valley of Foligno and Spoleto, the valley of Terni, the elevated plain of Rieti, and the rich territory around Perugia.

The central ridge of the Apennines, which forms the watershed between the Adriatic and the Mediterranean, enters the Papal State from Tuscany north of Cittá di Castello, and runs in a south-south-east direction, forming for a while the eastern boundary of the valley of the Upper Tiber, and dividing the waters of the Metaurus, which run into the Adriatic, from those of the Chiascio, an affluent of the Tiber. The road from Rome to Pesaro by Nocera passes over this part of the ridge, between Gualdo and Cagli. Near the latter town is a defile cut through the rock by the antient Romans, now called Il Furlo. East of Nocera the ridge becomes more lofty between the sources of the Esino and Potenza, which run to the Adriatic, and those of the Topino, which flows southwards by Foligno into the Tiber. Farther south-east there is a depression, through which passes the high road from Rome to Loreto and Ancona. This mountain-pass, which lies between Serravalle and Foligno, is known by the name of the pass of Colfiorito. South of this pass the Apennines form a lofty group extending to the eastward, and known by the name of Monte Sibilla, the Mons Tetricus of the antients, which is 7200 feet high, and is the highest summit in the Papal State: it divides the waters of the Tronto, which flows to the Adriatic, from those of the Nera, which flows south-west into the Tiber. The ridge then joins the mountains of Abruzzo in the kingdom of Naples east of Norcia. Two offsets detach themselves from the main ridge above the sources of the Nera, and run south, skirting the two banks of that river as far as its junction with the Tiber. The more eastern offset is intersected by the Velino, which makes its way through it by a fine waterfall not far from Terni. The whole fall of the Velino, from the level of the water above the cascade to its confluence with the Nera through a succession of rapids, is above 1000 feet. The country eastward of the Nera consists of high lands, which adjoin those of Abruzzo, and are a most interesting region, but seldom visited by travellers. [RIETI.]

The southern division of the Papal State chiefly consists of the basin of the Tiber. This river rises at the foot of Monte delle Balze in a deep dell of the Tuscan Apennines, and not, as is often erroneously stated, in the mountain of Falterona near the sources of the Arno, from which those of the Tiber are about 20 miles distant to the east-south-east, the lofty ridge Dell' Alvernia intervening between the two rivers. The Savio, which flows by Cesena to the Adriatic, has its sources on the north side of the same mountain on the south slope of which are those of the Tiber. The Tiber rises from two springs of limpid water in a wood of beech-trees, and, being swelled by mountain streams, flows in a south direction through a narrow valley called Val Tiberina, between the mountains Dell' Alvernia and Catenaia on the west and the Alpe della Luna on the east, which last forms part of the main or central ridge of the Apennines, and separates the waters of the Tiber from those of the Metaurus. The river passes by the towns of Pieve Santo Stefano and Borgo San Sepolcro, after which it receives the river Sovara, and soon after leaves the Tuscan territory and enters the province of Perugia in the Papal State. (Benci, *Lettere sul Casentino e la Val Tiberina*, in the *Antologia* of Florence, Nos. 10 and 11.) It then flows by the walls of Cittá di Castello, and after a rapid course of about 50 miles from its sources it reaches the foot of the hill upon which stands the town of Perugia. it then flows through a fertile valley, receiving on its left bank the united waters of the Chiascio from the mountains of Gubbio, the Topino from Foligno, and the Maroggia, joined by the Clitumnus, from the valley of Spoleto; and lower down, on its right bank, the river Nestore, which comes from Cittá della Pieve on the borders of Tuscany. The river then enters a narrow gorge between two rocky ridges, on one of which stands the town of Todi, the antient Tudertum or Tutere, a city of the Umbri and afterwards of the Etruscans, which is more than 1000 feet above the sea. Part of the walls of Todi is of Etruscan construction, and in its territory has been found a vast quantity of Etruscan medals and other antiquities. (Cæsius, *Elogium in priscum Tuderti Decorem*, 4to., 1632; Lauro,

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[*] Seventy-four Roman miles make one degree of latitude.

Todi, antichissima Città dell' Umbria, 1635.) The bottom of the river here falls about 2 feet in every 1000 feet, and the bed being confined and partly encumbered by stones and gravel brought down from the mountains, the waters rise in flood times as high as 24 feet, but the river is very shallow in the dry season. The navigation of the river, which, from Perugia to Todi, is carried on merely by rafts, becomes here totally interrupted. The Tiber, after receiving the Naia and other mountain-streams, issues out of the gorge at the rapids called 'Passo del Forello,' after which it enters a broad valley. It receives near Orvieto the river Paglia from the mountains of Tuscany, which is swollen by the waters of part of the Chiana. [Chiana.] The river now assumes a more regular and less rapid course, flowing in a deep bed and inclining to the south-west. It receives the Vezza from Montefiascone, and lower down the Nera, the largest of its affluents, near the town of Orta. The whole course of the Tiber, from its sources to the confluence of the Nera, is about 110 miles. From this point the regular navigation of the Tiber begins: boats of various sizes, some of which are 80 feet long and of 80 tons burden, carry to Rome wine, corn, charcoal, wood, and other produce of the upper country. In ascending the river, they are towed up by buffaloes.

The Nera, the ancient Nar, a considerable river, rises in the high Apennines above Norcia, and is increased by the waters of part of the Abruzzo and of the Papal province of Rieti, through its affluents the Corno, Velino, Salto, and Turano. Flowing through a deep valley between the Sabine Mountains on one side and the mountains of Spoleto on the other, which divide it from the valley of the Clitumnus, it passes the towns of Terni and Narni, and, after a course of about 70 miles, enters the Tiber near Orta.

After the confluence of the Nera, the Tiber flows through a valley between the Sabine Mountains on one side and the offsets of Mount Cimino on the other: it receives on its right bank the united waters of the Treia from Civita Castellana and the Ricano, which is the outlet of the small lake of Vico, after which the valley becomes contracted between Mount Soracte on the west and the mountains of Poggio Mirteto on the east. After this contraction, it opens into the wide undulating plain of the Campagna. Three miles above Rome the Tiber receives the Anio, or Teverone, from the eastern Apennines, which has a course of above 60 miles. The course of the Tiber, from the confluence of the Nera to Rome, is about 70 miles, in which distance the width of its bed varies from 160 to 300 feet, the depth from 8 to 22 feet, and the fall is about one foot in every 2000 feet. Boats are three days in coming down from Orta to Rome, but in summer the navigation is often interrupted, owing to the shallowness of the water in several places. Within the walls of Rome the Tiber is about 300 feet wide and from 12 to 18 feet in depth. The river is never fordable in or near Rome. During heavy rains and floods the waters sometimes have risen more than 30 feet above their ordinary level, overflowing the lower parts of the city, and occasioning considerable mischief. The maritime navigation begins below Rome: the Tiber, after being confined by the quays and buildings of the town, spreads out to the width of 300 feet, until its bifurcation at Capo due Rami, a distance of 17 miles from Rome. From thence one branch of the river runs south-west into the sea by Ostia, a distance of about 5 miles, but is rendered useless for purposes of navigation by the accumulation of alluvium and sand at the mouth. [Ostia.] The other branch, which was widened by Trajan, and has been improved at various times by the popes, in order to keep open the communication between Rome and the sea, runs for about 4 miles, until it enters the sea at Fiumicino, where the entrance is secured by two long piers consisting of wooden palings and fascines. In winter time vessels of from 150 to 190 tons, besides smaller ones, ascend the river to Rome, but in summer there is often not more than 9 or 10 feet of water on the bar, and only boats of 40 or 50 tons can ascend to Rome. There is no perceptible tide in this part of the Mediterranean, and the vessels are towed up by buffaloes. (*Carta Geografica dello Stato della Chiesa*, by Le Maire and Boscovich, dedicated to Benedict XIV.; Bacci, *Del Tevere Libri IV.*, Roma, 1558-99; Martinelli, *Descrizione di diversi Ponti sopra li Fiumi Nera e Tevere*, &c., 1676; Tournon, *Études statistiques sur Rome*, book v.)

The basin of the Tiber below Rome is bounded on one side by the Alban Mount, and on the other by the offsets of Mount Cimino, which surround the basin of the lake of Bracciano, the waters of which enter the sea by the river Arrone. The Tiber, below Rome, receives only some small streams, the principal of which is the Galera, on its right bank. The basins of the lakes of Bracciano and Bolsena, which are separate from that of the Tiber, constitute, together with the basin of the river Fiora, near the Tuscan border, the greater part of the province of Viterbo, called also Patrimonio di S. Pietro. [Viterbo, Province of.] In the opposite or south-east direction, the Alban Mount separates the basin of the Tiber from that of the Pomptine marshes; and farther north the mountains of Palestrina separate the basin of the Tiber from that of the Liris, of which the Sacco is an affluent. [Palestrina.] With these exceptions, the whole southern division of the Papal State, from the central Apennines to the sea, is included in the basin of the Tiber, which also comprises a considerable part of Abruzzo, the waters of which country run by the Corno, Velino, Salto, Turano, and Anio, into the Tiber, and also that part of Tuscany in which the Tiber has its source, and another part farther south, near Radicofani and Chiusi, which is drained by the rivers Paglia and Chiana. The whole basin of the Tiber may include a surface of rather more than 10,000 square miles. The length of the river's course, with its windings, is about 260 miles. The Tiber is the largest and most important river of the peninsular part of Italy. The waters of the Tiber from Perugia downwards to the sea are muddy and yellowish, a peculiarity which is expressed by the epithet 'flavus' by the Roman poets. The current as it enters the Mediterranean retains its colour for a considerable distance from the shore, and contrasts with the generally blue tinge of the sea-water, with which it does not mix for some miles.

The Papal State is now divided for administrative purposes into fourteen provinces, namely, ROMA (COMARCA DI); VITERBO; FROSINONE; SPOLETO; PERUGIA; MACERATA; FERMO; ANCONA (MARCA DI); PESARO E URBINO; FORLI; BOLOGNA; RAVENNA; FERRARA; BENEVENTO. The population of the whole, according to an official report published by the government in 1833, was 2,742,000 inhabitants. The annual increase of the population appears to be at the rate of 4½ per 1000, which is considerably lower than in the kingdom of Naples, in Tuscany, and other Italian states. (Serristori, *Statistica d' Italia*.) The population is Roman Catholic, with the exception of about 10,000 Jews, who are distributed in Rome, Ancona, Sinigaglia, Pesaro, Urbino, Ferrara, Lugo, and one or two more towns. The provinces, with the exception of that of Rome, are styled Delegazioni; and the representative of the sovereign, who is at the head of the administration, is styled delegate, and is always a church dignitary. If a cardinal, he is styled legate, and the province assumes the name of Legazione. The delegate or legate is assisted by a council, composed of four laymen, appointed by the pope. There is also in every province a provincial council for local and financial affairs, which assembles for a fortnight once a year under the presidency of the delegate or legate. For this purpose the communes appoint electors, who assemble at the head-town of their respective districts, and there choose the deputies to the council. One-third of the council is changed every two years. Every delegation or province is divided into districts, and every district into communes. Each commune consists of a town or large village, with the territory and hamlets belonging to it. The communes vary greatly in population; from 1000 to 12,000 or 14,000. At the head of each district is a governor, appointed by the pope, who is also judge in the first instance, and is subordinate to the delegate in his administrative but not in his judicial capacity. Every commune has a council, consisting of forty-eight members in the head towns, of thirty-six or twenty-four in the smaller towns, and of eighteen in villages which do not contain more than 1000 inhabitants.

The members are taken in equal proportions from two classes, nobles and citizens or farmers. The office of communal councilman is for life and hereditary. The councils deliberate upon the affairs of their respective communes, and make out, in August every year, the 'tabella di prevenzione,' or budget, in which are specified the probable expenditure of the following year and the means for meeting it, including additional local taxes if required. This 'tabella' is forwarded to the delegate, who examines it, and then forwards it to Rome, where the board called 'Congregazione del Buon Governo' approves or modifies it. The tabella is then returned to the communes, who publish it, upon which it becomes law, and no magistrate can depart from its provisions. The communal council appoints yearly, by a majority of votes, the local magistrates, namely, the gonfaloniere, and six, four, or two elders, according to the size and population of the commune, subject however to the approbation of the delegate. The gonfaloniere, who must be chosen from the class of the nobility, is changed every year, and the elders every two years. The communal council appoints likewise all the officers and other servants of the commune, the secretary, the communal attorney, the receiver, the surgeon and apothecary (who for a fixed salary is obliged to attend the poor inhabitants gratis), the schoolmaster, the local police, &c. In the month of February the council examines the accounts of the preceding year, and transmits them to the delegate. The councils are always presided over by the gonfaloniere or by the governor in the head town of a district, who has a vote. The former baronial jurisdictions, privileges, and immunities have been abolished. (*Moto proprio di S. S. Leone XII. sull' Amministrazione pubblica*, &c., 5 October, 1824.) 'This system of municipal administration,' observes Count Tournon, who was prefect of Rome during Napoleon's usurpation, 'will perhaps surprise those who imagine that in the Papal State everything is left to the will or caprice of the sovereign. Abuses of power are common, no doubt, but the written law is more favourable to the liberties of the people than is commonly supposed.' (*Etudes statistiques sur Rome*, vol. ii., pp. 41, 72.) The communal councils are in fact more independent of the central authority than those of France. The common lands were sold by Pius VII. in order to supply the urgent wants and exactions of the French military. The ordinary revenue of the communes is now derived from taxes levied upon provisions coming to market, like the French octroi; and the extraordinary deficiency is made up by a capitation tax and a tax upon cattle. The expenditure consists of administrative, judicial, and police salaries, the repairs of the roads, public buildings, fountains, &c., the emoluments of the communal surgeon and apothecary, schoolmaster, and preacher who comes during Lent and Advent to deliver sermons adapted to those epochs. In the larger towns there are schoolmistresses, called Maestre Pie, paid by the commune for the elementary teaching of girls. Every Sunday afternoon, the children assemble in the various churches to hear the 'dottrina,' or catechism, explained to them by the rector or his assistant, and be examined upon it. Still there is no universal system of elementary instruction enforced as in North Italy, and the proportion of illiterate people in the Papal State is much greater than in Lombardy.

The universities are those of Rome, Bologna, Perugia, Ferrara, and Macerata. There are also 21 colleges or gymnasia, four at Rome, and the others in the chief towns of provinces. Females of the higher classes are chiefly educated in convents.

With regard to the central government, it is an elective monarchy; the pope for the time being is the absolute sovereign of the state; he consults the cardinals assembled either in special congregations, or, in cases of great importance, in general consistory, but he is not bound by their opinion. His two principal ministers are the cardinal secretary of state and the cardinal Camerlengo. The former superintends the department of foreign affairs and the home department; he is appointed by the reigning sovereign, at whose death his office expires. The cardinal Camerlengo is the finance minister, and is appointed for life; he has under him a treasurer. The governor of Rome is under the authority of the secretary of state, but is vested with great discretionary powers as to the police of the capital and its territory. The congregation or board called 'Sacra Consulta,' consisting of cardinals and prelates, superintends the administration of the provinces, and is also a court of appeal for criminal matters. A prelate and three general officers form a board for military affairs. The Papal State is divided into three military divisions, with an inspector at the head of each; the head-quarters are Rome, Ancona, and Bologna. The army consists of ten battalions of native infantry, 7200 in all; two Swiss regiments of two battalions each, 4840; native cavalry 1050 men, and artillery 1000; two companies of Swiss artillery, 250; the carabineers, who have the charge of the police like the French gendarmes, 2500 strong; a corps of riflemen, 1000; and 1500 custom-house guards: total, 18,740 men. There are also several battalions of militia and volunteers.

The judicial department consists of a judge, called Prætor, for civil matters in the head town of every province; two courts of appeal, one at Rome and the other at Bologna; and a Court of Cassation, called La Segnatura, which sits at Rome. The ecclesiastical courts in each diocese judge of suits between clerical persons, and also between laymen who agree to bring their disputes before these courts. For criminal matters, there is a collegial court in every province, presided over by the delegate; and two courts of appeal, one at Rome and the other at Bologna. When an appeal is laid before the sovereign, the 'Uditor Santissimo,' a prelate of the first class, judges finally of the case. The tribunal of the Inquisition and other ecclesiastical courts continue to take cognizance of matters within their respective jurisdictions. According to a table of criminals who were suffering punishment at the end of the year 1832, given by Serristori, there were 580 tried for murder or homicide, 277 for wounds inflicted, 340 for robbery, 215 for thefts, 811 for petty larceny, 91 for rape, 76 for political crimes, 66 for correctional or police matters, 7 for coining, and 244 for other crimes not defined; in all, 2708. It appears from this report that offences against the person still bear a very high proportion in the calendar of the Papal State. The penalties are imprisonment and hard labour either for life or for a term of years. Capital executions are resorted to only in very aggravated cases. Torture has been finally abolished. Tribunals of commerce are established at Rome, Bologna, Ancona, and some other of the principal towns.

The revenue amounts to about nine millions of Roman scudi (the scudo is worth 4*s.* 5*d.* sterling), a sum considerably exceeded by the expenditure for several years past, the deficit having been made up by additional loans and issues of exchequer bills. The interest of the funded debt is 2,547,000 scudi; the collection of the revenue costs about one million and a half; the military establishment costs about two millions; the judicial establishment, nearly one million; the administration, half a million; the civil list of the pope and his court, 265,000 scudi; payments to the cardinals, 122,000; public works, roads, &c., 540,000; public instruction, 108,000; charitable establishments, 267,000. The principal sources of the revenue are the land-tax, which amounts to nearly two millions of scudi; customs, one and a half million; excise, including the 'macinato,' or duty on flour, nearly two millions; monopoly of salt and tobacco, 1,200,000 scudi; stamps and registry duty, 578,000; post-office, 288,000; lottery, 896,000.

The population of the Papal State is chiefly agricultural A great extent of land is used for pasture. The exports are cattle, wool, cheese, lambskins, tallow, hemp, oil, some silk, vitriol, sulphur, pozzolana, potash, and cream of tartar. The salt-pans of Cervia and Comacchio, near the Adriatic coast, supply most of the salt for the consumption of the country Vitriol is found near Viterbo, alum at La Tolfa near Civitavecchia, sulphur near Rimini, and coal near Pesaro and at Sogliano near Forli. Wood and charcoal are the only fuel used.

The manufactures of the Papal State are of more importance than is generally supposed. Court Tournon, thirty years since, remarked on the dogmatic flippancy of travellers who told the world that 'the sale of relics and indulgences constituted the whole commerce of Rome, and the manufacture of beads and saints' images the only industry of the people.' (*Etudes Statistiques sur Rome*, b. iii.) But since Tournon's time, manufacturing industry has considerably increased. One of the principal and oldest branches is that of woollen cloths, which are made in various towns of the state, and chiefly supply the internal consumption, especially of common or coarse cloth. The silk manufacture is on the increase at Rome and Bologna. Tanneries are established, chiefly at Ancona, Bologna, Pesaro, and Sinigaglia. The manufacture of paper is also on the increase, as well as that of hats. Manufactories of soap are about forty in number, but the principal manufactory is at Pontelagoscuro, near Ferrara. There are iron-smelting furnaces at Bracciano, Canino, and Conca, and iron-works in various other places. There are glass-works in several towns, and plate-glass is made at Poggio Mirteto. Two cotton manufactories have been established at Rome, but they do not seem to thrive. Cables and rope are made in the northern provinces, and exported to Greece and the Ionian Islands. The other manufactures are wax candles, to a considerable amount, chiefly for the use of the churches; catgut, which is in great repute, and liquorice, of which there is a manufactory at Grottamare, near Fermo, as well as an extensive sugar-refinery at the same place. Serristori (*Statistica d'Italia*) gives a list of all the manufactures of the Papal State. The annual exports are stated at above five millions of scudi, not including the works of art and antiquity, sculptures, paintings, models, mosaic, &c., which form another considerable branch of export, the value of which is not ascertained, as almost every traveller who visits Rome carries away with him some articles of the kind. The imports are reckoned, according to the custom-house returns, at nearly seven millions of scudi; they consist chiefly of tobacco for the government manufactory, from Hungary, Albania, and Brazil; raisins and other dried fruit from Naples and Sicily; colonial produce from England and France; salt fish, to the amount of nearly nine millions of pounds weight, chiefly from England; iron from Elba; lead from England, besides manufactures of fine cloth, silks, cottons, hardware, and articles of luxury from France and England.

The maritime trade of the Papal State is carried on chiefly by foreigners. This is the branch of industry most neglected by the natives of the Papal State. Even the coasting-trade and the fishing along the greater part of the coast are carried on in great measure by foreign boats. The Neapolitans fish all along the Mediterranean coast, and the Venetians along that of the Adriatic, as far as Cesenatico; the native boats fish only along the coast of the Marches from Rimini to the Tronto. The Neapolitans supply Rome with fish, which is taken on its own coast. The consumption of fish is very great, owing to the number of meagre days in Lent, and at other times, which are ordered by the church of Rome, and enforced by the civil laws of the country. It is calculated that the annual consumption of fresh fish throughout the Papal State amounts to thirty millions of pounds weight. Austrian vessels, to the number of 800, carry on most of the trade in the Adriatic ports of the state; and Neapolitan, Genoese, and Tuscan vessels or boats, in those of the Mediterranean. On the Adriatic coast the natives of the Papal State possess about 230 vessels, chiefly small craft, and about 350 fishing-boats. The Papal navy consists of an armed schooner, stationed at Civitavecchia, and a few custom-house boats at Civitavecchia and Ancona.

According to Calindri (*Saggio Geografico Statistico dello Stato Pontificio*) the number of monks, friars, and other clergy living in communities in the Papal State amounts to about 10,440, distributed among fifty various monastic orders or congregations; that of the secular clergy, to 34,660; and that of the nuns and other women living in cloisters, is 8200: making in all 53,300 individuals of both sexes devoted to religious celibacy, which is about 1 for every 52 of the whole population. The number of adult lay persons of both sexes living in voluntary celibacy (not including those already mentioned) is about half a million, 89,000 in a state of widowhood, whilst that of married persons is 913,800. The rest of the population consists of children of both sexes. There are in the whole state 100 towns, and 722 'terre,' or large villages having municipal councils, besides hamlets.

Savings' banks have been established of late years at Rome, Ancona, Bologna, and some other towns; an insurance company has been formed at Rome, as well as a bank, with a charter for a limited period.

Monti di Pietà have been long established at Rome and other large towns of the state. (MONT DE PIETÉ.)

The principal products of the Papal State are: 1, corn, namely wheat, barley, rye, and Indian corn, which are produced in great quantity in the northern and eastern provinces; rice is also extensively cultivated in the low grounds; 2, oil, which is made in considerable quantity, but is generally of inferior quality; the best is made in the hills of Sabina, Orvieto, and the Marches; 3, wine, of which the greater part is ordinary wine, for home consumption; some better qualities however are made in the Marches, and on the hills of Albano, Orvieto, and Montefiascone; 4, pulse and vegetables of every kind; 5, fruit, including lemons and oranges, which grow in the open fields only in the southern provinces, and chestnuts in the highlands; 6, hemp and flax, especially in the provinces near the Adriatic; 7, silk is made in the eastern provinces, especially near Fossombrone; 8, tobacco is grown also in the eastern provinces near Ancona; 9, timber and wood for fuel. The Papal State is still well provided with forests of oak, cork trees, elm, ash, and pine; among the pine trees the *Pinus pinea* is remarkable for its height and elegant appearance. The principal forests are on the sides of the Apennines, on the Mounts Cimino and Albano, on parts of the Mounts Lepini, and along the sea-coast of the Mediterranean. The fine pineta, or pine forest, near Ravenna, along the Adriatic shore, has been noticed by Byron, in 'Childe Harold,' canto iv.

The horned cattle are remarkably fine, especially in the province of Perugia and the Campagna of Rome, and also in the province of Ferrara. Calindri reckons the horned cattle at 1,238,000 head. Very good cheese and butter are made, especially in the southern provinces. The sheep are reckoned at two millions. The finest are said to be those of the province of Macerata in the Marches. Much cheese is made of ewes' as well as goats' milk. Pigs are reared in great number, especially in the Campagna. Wild boars are numerous in the Pontine Marshes. The horses are reckoned at about half a million in the whole state. The lakes and rivers abound with fish; the eels of Bolsena and Comacchio are celebrated.

Upon the whole the Papal State is very far from being poor and unproductive, as is supposed by most foreigners, and as has been carelessly stated by many travellers who have merely crossed the desolate plains of the Campagna, and have taken them as a specimen of the whole country. There is no doubt however that the country might be made more of, and that the agriculture and other branches of industry are susceptible of great improvements.

Modern History.—The origin and formation of the sovereign state called the Papal State, which is annexed to the See of Rome, is one of the most obscure and intricate subjects in the history of modern Europe. Setting aside the pretended donation of Constantine, we find that, after the fall of the Western empire and the re-conquest of Italy by Belisarius and Narses, Rome and the adjoining territory were administered by an officer called prefect, duke, or patrician, appointed by the Byzantine emperor, and subordinate to the exarch of Ravenna. Rome retained its municipal government, had its senate and assemblies of the people, and the bishop of Rome, styled 'Præsul' in some of the documents of those times, was elected by the joint votes of the clergy, the senate, and the people, but was not consecrated until the choice was confirmed by the Eastern emperor. The See of Rome enjoyed large revenues and benefices, the gifts of various emperors, besides the gifts and bequests of private persons and the alms of the pilgrims and other pious persons. During the two centuries that the Longobards occupied the greater part of Italy, they often threatened but never took Rome, and the people of that city, forsaken as it were by the Eastern emperors, accustomed themselves to look upon their bishop as their chief defender and protector. The popes, through their spiritual influence and also their personal activity, were the chief means of preserving Rome from being occupied by the Longobards, but they acted generally in concert with the exarchs of Ravenna, at whose court they kept an agent. The services rendered to Rome and to Italy in general by the popes during that period, and the true character of the dominion of the Longobards over the native Italians, have been exhibited with great fairness by Manzoni, in his 'Discorso sopra alcuni Punti della Storia Longobardica in Italia,' published at the end of his tragedy of 'Adelchi,' and in which he combats the party statements of Giannone and other writers, who, through a feeling of resentment against the subsequent encroachments of the Papal See, have misjudged and misrepresented the real state of the question between the popes and the Longobards.

The persecution of images and image worship by Leo the Isaurian, about A.D. 720, dissolved the loose bond that still attached Rome to the Eastern empire. The Romans and the Italians in general refused to submit to the edict of Leo, and after the emperor was condemned by Pope Gregory II. in the council of Rome, A.D. 726, they refused to pay the usual tribute to the Eastern empire. About the same time a conspiracy was discovered at Rome against the life of Gregory, in which Marinus, duke or imperial lieutenant of Rome, was implicated in concert with the exarch of Ravenna, and the consequence was, that the Romans would no longer acknowledge the authority of Marinus. (Anastasius, *Vita Gregorii II.*, in Muratori's 'Rerum Italic. Scriptores.') The Byzantine writer Theophanes says that the pope countenanced and encouraged this feeling in the people; but Paulus Diaconus (vi. 49) says that 'the people and the troops at Ravenna and in the Venetia resisted, all of one accord, Leo's edict against the images, and would have proclaimed another emperor, had not Pope Gregory dissuaded them from it.' Meantime Luitprand, king of the Longobards, took from the Byzantines the greater part of the exarchate and the Pentapolis, which latter corresponds to the present March of Ancona.

Rome now governed itself as an independent commonwealth, retaining the title of duchy, having its senate, its consuls, and tribunes, and forming alliances with the dukes of Benevento and Spoleto, and with King Luitprand. The pope was generally the mediator or active promoter of these transactions. As the good understanding between the Longobards and the Romans was not however of long duration, the latter at times resumed an intercourse with the court of Constantinople, and they even applied to Constantine Copronymus to send them assistance: but the Greek emperors being unable or unwilling to exert themselves in defence of Rome, the popes began to think of turning themselves for protection towards the West, where the Frankish monarchy had attained great extent and importance. Gregory III., Zacharias, and Stephen III. wrote repeatedly to Charles Martel and his successor Pepin in the name 'of the senate and the people of Rome,' who, having renounced their allegiance to the Eastern emperor, wished to place themselves under the powerful protection of the kings of the Franks. Their letters are inserted in the 'Codex Carolinus.' Stephen III., after having crowned, by means of his legate, Pepin, king of the Franks, at Soissons, A.D. 751, conferred upon him the title of Patrician of Rome, which was the appellation of the officer who used to represent the Byzantine emperor in that city. And when Astolphus, king of the Longobards, devastated the territory of Rome, Stephen wrote to Pepin, in the name 'of the Church, and of the dukes, counts, tribunes, and people of Rome,' to urge him to defend the city of which he had been appointed first magistrate. Pepin repaired to Italy with an army, and, having defeated Astolphus, obliged him not only to respect the duchy of Rome, but to give up the exarchate of Ravenna and the Pentapolis, not to the Eastern emperor, their former possessor, but 'to the Holy Church of God and the Roman republic.' Such are the words used by the historians of those times, but the text of Pepin's donation is lost. The following list of the towns included in this grant is given by Anastasius:—Ravenna, Rimini, Pesaro, Fano, Cesena, Sinigaglia, Jesi, Forlimpopoli, Forli, Montefeltro, Castel Sussubio, Acerragio, Monte di Lucaro, Cerra, Castel S. Mariano, Bobbio, Urbino, Cagli, Luceolo, Gubbio, and Comacchio. Astolphus sent the keys of these towns to be deposited on the altar of St. Peter at Rome, but he did not give up the towns, and the possession of the Church and the Roman republic was merely nominal. The popes complained repeatedly in their letters of the nonfulfilment of the act of donation. Desiderius, the successor of Astolphus, at one time gave up some if not all of those towns to be administered, not by the Romans, but by the archbishop of Ravenna, who was considered as standing in the place of the former exarchs. (Agnellus, *Liber Pontificalis, in Vita Sergii Archiepisc.*, in Muratori, 'Rer. Italic. Script.' vol. ii.)

Charlemagne, urged by the entreaties of Adrian I., having come to Italy, defeated Desiderius, and overthrew the kingdom of the Longobards. He assumed the title of Patrician of the Romans, and he is stated to have confirmed his father's donation of the exarchate and Pentapolis; afterwards however we find Adrian repeatedly urging him by letters, but apparently to no purpose, 'to fulfil, for the good of his soul, what he had promised in favour of the Church and the Roman republic.' It would not seem that Charlemagne ever intended to give up the regal rights or sovereignty of those towns and territories, for he assumed the imperial authority even over Rome, by the consent of the Romans themselves, and money was struck and public acts done in his name, 'imperante Domino nostro Karolo.' But he gave to the See of Rome the rents and fees of extensive domains in the exarchate and Pentapolis and other provinces, whilst he kept the regal rights. Another act of donation by Louis the Pious, son of Charlemagne, is cited by Baronius, in which that prince gives to the See of Rome not only the Æmilia or Exarchate, and the Pentapolis, but also Sicily, Calabria, the duchy of Naples, Sardinia, and other countries which had never belonged to Louis or Charlemagne: but Pagi, Muratori, and most other critics, consider this act as apocryphal.

Under the Carlovingians Rome was an imperial city, with its municipal government and its senate; its territory or campagna was occupied by powerful nobles or barons, and the pope himself, in his temporal capacity, was the principal baron at Rome. The other provinces which now constitute the Papal State, such as Spoleto, Viterbo, Camerino, Fermo, &c., were in the possession of dukes or counts who were vassals of the crown of Italy. The popes, following the example of the great feudatories of those times, granted part of their extensive domains in subinfeudation to lay barons on military tenure, and this seems to have been the origin of the petty principalities of the Romagna. In the course of centuries, these subfeudatories, who, during the anarchy of the kingdom of Italy, had made other acquisitions of territories and towns, considered themselves and acted as independent princes, until Innocent III. and other popes subdued them by force, asserting their right not only over the domains subinfeudated by their predecessors, but over the towns and territories which the various princes had acquired by themselves or had received by grant from the emperors and kings of Italy; and the popes then put forth in support of their claims the old and never executed donations of Pepin and Charlemagne. This however did not take place till the beginning of the thirteenth century, about 400 years after Charlemagne. During this long period the emperor or king of Italy was considered as the sovereign of the whole country, and whenever he came to Rome he exercised his sovereign rights in that city as in the rest of Italy. But in his absence, the duchy of Rome, as it was still called, was often in a state of anarchy, its government fluctuating between a democracy and the power of the great feudal families. Some of these families influenced the election of the popes, as was the case in the tenth century, when Theodora, her daughter Marozia, and Alberic, the son of Marozia, were all-powerful at Rome. At last Otho of Saxony came to re-assert the imperial authority over Rome and the rest of Italy. [Otho I.] Otho II., in a diploma which he gave to the republic of Venice at a general diet held at Verona, A.D. 983, enumerated the towns of the Exarchate and Pentapolis as subject to the kingdom of Italy. [Otho II.] Under his successor Otho III., Crescentius, a Roman noble, being appointed consul by the people of Rome, attempted to free that city and its duchy from the dominion of the German emperors, and to replace them under the nominal allegiance of the emperors of the East, who, being distant and weak, would have left the Romans in a state of comparative independence. He however failed, and was beheaded by order of Otho III. John, the son of Crescentius, about the year 1010, restored in Rome the republican form of government, with a senate of twelve senators, two consuls, assemblies of the people, and a prefect to administer justice. (Ditmarus, b. vi.; Mabillon, *Annales Benedict.*, ad anno 1011.) The temporal power of the popes in those times was very little, being restrained on one side by the republican spirit of the people, and on the other by the imperial power, which retained the ascendency whenever the emperor visited Rome. But although nearly destitute of temporal power in Rome and the Roman territory, the popes found means through their spiritual influence to establish the authority of the see of Rome over larger and finer regions. Leo IX. granted to the Norman adventurers who had conquered Apulia, the investiture of that county as well as of Calabria and Sicily in the name of St. Peter, to be held as a fief of the Roman see, to which the crowns of Sicily and Naples have continued till within our own times to pay tribute as vassals.

The great contest of Gregory VII. against the emperor Henry IV. had for its object to exalt the authority of the church over the civil power in general, and to assert at the same time the supremacy of the see of Rome over all other sees. But during this struggle an important addition was made to the temporal claims of the see of Rome by the donation of the Countess Matilda, the staunch supporter of the papal power. This lady added to her paternal fiefs in the Modenese, Parmesan, and Mantuan territories, the rich succession of Godfrey, marquis of Tuscany, second husband of her mother Beatrix. (Florentini, *Memorie della gran Contessa Matilda*; Donizo, *Vita Comitessæ Matildæ*.) She twice made donation of her territories, first to Gregory VII. and afterwards to Pascal II., which last is in her will dated A.D. 1102. But Matilda, as a vassal of the empire, could not alienate her feudal rights, but merely her allodial property, and the words of her will seem to bear the latter meaning, 'omnia bona sua jure proprietario.' (Muratori, *Rer. Ital.*, vol. v., at the end of Donizo's *Life of the Countess*.) However, Henry V., in 1116, the year after Matilda's decease, settled the question by taking possession of the whole of her property. But Matilda's donation continued long after to furnish to the see of Rome claims over a considerable part of northern and central Italy.

Innocent III. was the first pope who really formed a Papal temporal State. He found the imperial power asserted over all Italy by Henry VI., in his double capacity of king of Lombardy and king of Sicily. The emperor had distributed the domains of Matilda as fiefs among his generals. His great seneschal Marcovald was duke of Romagna and marquis of Ancona; Philip, duke of Suabia, was marquis of Tuscany; and Conrad of Suabia, duke of Spoleto. But after the death of Henry in 1197, and of his wife Constance in the following year, their infant son Frederic was left to the guardianship of Innocent, who availed himself of the opportunity to assert the claims of his see founded upon the donations of Pepin and Charlemagne and of Matilda. He knew that the German feudatories had abused their power, and that their subjects were ripe for change. He sent two cardinals to take possession of Spoleto and the Marches, and the towns of those provinces willingly opened their gates to them, and swore allegiance to the see of Rome, their municipal franchises being guaranteed to them at the same time. These towns were Spoleto, Foligno, Nocera, Perugia, Gubbio, Todi, Rieti, Assisi, Città di Castello, Ancona, Fermo, Camerino, Sinigaglia, Osimo, Fano, Jesi, and Pesaro. Rome and its duchy were still governed as a republic, the democratic spirit of the people having been fanned and revived some time before by Arnaldo da Brescia. The authority of the senate had been formally acknowledged by Celestine III., Innocent's predecessor, and was determined by a charter of the pope, which is given by Muratori (*Antiquit. Ital. Dissertation.*, 42). But the people of Rome soon becoming tired of their senate, for whose authority they had fought, abolished it, and substituted, after the example of other Italian cities, a foreign elective magistrate, whom they styled 'the Senator,' and to whom they gave the powers till then enjoyed by the senate; they made him the head of the militia, and of the judicial administration; and they allotted the senatorial palace on the Capitol for his residence. This institution (with some alteration in its character) has continued at Rome to this day. The first senator was Benedetto Carissimo, who at the end of two years was replaced by Giovanni Capoccio. During their administration, the Romans took and destroyed Tusculum, subjugated the whole of Sabina and Campagna, and obliged the towns of those provinces to receive in future the magistrates which Rome should appoint. (Vitale, *Storia diplomatica dei Senatori di Roma*, Rome, 1791; Carolus Curtius, *Commentarius de Senatu Romano post tempora Reipublicæ Liberæ*.)

Innocent III. did not alter the form of the municipal institutions of Rome, but he contrived to have a senator chosen among his friends, and he dictated the form of the oath which that magistrate took to him. By this oath, which is given by Vitali, the senator bound himself 'to maintain the pontiff in possession of his see and of the regal rights which should belong to St. Peter's church; not to conspire against him so as to occasion him the loss of life or limb, but to reveal to him all conspiracies and machinations which might come unto his knowledge; and lastly to provide for the safety of the cardinals and their households in every part of Rome and its jurisdiction.' At the same time Innocent obliged the prefect of the city, who was an imperial officer, to pay allegiance to himself, and to receive from his hands a fresh investiture; and lastly he took upon himself to remove the judges and podestas of the towns of the Campagna, who had been appointed by the Roman republic, and he named others in their stead, thus appropriating to himself the sovereignty of a country which the Romans had lately conquered.

But the towns and territories thus subject to the papal see were still far from forming a compact state as it is in our days. The feudal rights of the nobles and the municipal franchises of the towns left to the sovereign little direct authority. The Papal State was not consolidated for nearly three centuries after Innocent III.

Rudolph of Habsburg, being elected emperor after a long interregnum, was entirely engrossed by German affairs, and had little time to bestow upon the kingdom of Italy, which had ever proved a troublesome appendage of the German crown, and he is said to have been ignorant of the geography of that country. Charles of Anjou, king of Sicily and Naples, was then the most powerful sovereign of Italy, and had extended his authority by various means over the north of Italy, where he had assumed the title of Imperial Vicar. Rudolph resented this usurpation, and Pope Nicholas III., interfering between the two sovereigns, induced Charles to give up Tuscany and Bologna, as well as the senatorship of Rome, which he had also obtained. At the same time the pope urged Rudolph to define by a charter the dominions of the holy see, and to separate them for ever from those dependent on the empire, and he sent to Rudolph copies of the donations or charters of former emperors. Rudolph, by letters patent dated May, 1278, recognised the States of the Church as extending from Radicofani to Ceperano, near the Liris, on the frontiers of Naples, and as including the duchy of Spoleto, the march of Ancona, the exarchate of Ravenna, the county of Bertinoro, Bologna, and some other places. At the same time, Rudolph released the people of all these places from their oath of allegiance to the empire, giving up all rights over them which might still remain in the imperial crown, and acknowledging the sovereignty of the same to belong to the see of Rome. This charter was confirmed by the electors and princes of the empire. Rudolph's letter and charter are found in Raynaldus's 'Annales' for the year 1278. This charter, important as a title, had little effect at the time. Rudolph gave up to the pope a sovereignty which was more nominal than real. Several of the towns thus ceded, as Bologna, Perugia, Ancona, had long governed themselves as republics, and were possessed of considerable territories; while others, such as Montefeltro and Bertinoro, constituted hereditary principalities, and the transfer of allegiance from the empire to the church made no alteration in their political condition. The pope sent his legate, Cardinal Latino, on a mission to Bologna and the Romagna, in order to produce a reconciliation between the Guelphs and the Ghibelines.

The removal of the papal see from Rome to Avignon, at the beginning of the fourteenth century, where it remained for seventy years, tended greatly to weaken the loose bond between it and the provinces above named. Accordingly we find during that period a number of petty princes and tyrants settled in central Italy often at war either among themselves or against the Visconti of Milan. The distant popes from Avignon sent legates with some mercenary troops to support the Guelph party, and to assert the authority of the papal see, but the towns and lords of Romagna stood their ground against them. At Rome, a man of obscure birth but endowed with eloquence and enthusiasm, a friend of Petrarch, put himself at the head of a popular movement, drove away the Colonna and other turbulent nobles, and proclaimed the republic, of which he was named tribune by popular acclamation. He re-established order, exterminated the robbers, and obliged the neighbouring barons to swear to maintain the new order of things, which he called 'the good state of Rome.' But the head of Rienzo was not proof against his sudden success; he became intoxicated with vanity and pride, disgusted the people, offended the barons, and at last the pope sent a legate to supersede him. After seven months' power Cola di Rienzo was obliged to run away from Rome, at the beginning of 1348, and, being arrested, was taken prisoner to Avignon. Innocent VI., some time after, having resolved to make a strong effort to reconquer the States of the Church, fixed upon Cardinal Gil Albornoz, a Spanish noble, who had already distinguished himself in the wars of Spain against the Moors, to command the expedition, A.D. 1353, and gave him Cola di Rienzo to assist him by his remaining influence with the Romans. Albornoz defeated Ordelaffi of Forli, Malatesta of Rimini, Vico of Viterbo, and other petty princes, and restored Romagna, the Marches, and the Campagna to the allegiance of the papal see. Cola di Rienzo, whom the cardinal had sent to Rome to second his views, was murdered there in a popular tumult, in October, 1354. [ALBORNOZ, GIL DE.]

The popes returned to fix their court at Rome in 1377, and the government of the Papal State then assumed a more regular form, occasionally interrupted however by insurrections of the people of Rome. [Eugenius IV.] A great part of the territory, especially north of the Apennines, continued in the hands of petty princes or tyrants. Alexander VI., in the year 1500, sent his son Cesare Borgia, who both by skill and treachery extirpated the tyrants of the Marches. [Borgia, Cesare.] Julius II., the successor of Alexander VI., put himself at the head of an army, conquered Romagna, Bologna, and Perugia, and from that time the Papal State acquired its present compact form. Ferrara was annexed to it in 1597 [Este, House of], the duchy of Urbino in 1632, after the death of the last duke Della Rovere without issue, and in 1650 the duchy of Castro and Ronciglione. [Farnese.]

In 1797, Bonaparte detached the four legations or provinces of Bologna, Ferrara, Ravenna, and Forli, and annexed them to the Cisalpine republic. In 1798 the French troops invaded Rome, and drove away the pope (Pius VI.). In 1801 the pope was restored to Rome and its territory, except the legations. In 1808 Napoleon detached the Marches, which he annexed to his kingdom of Italy, and in 1809 he took possession of Rome and the southern part of the Papal State, and annexed it to the French empire. In 1814 the pope was restored to his dominions. [Pius VII.]

The history of the Papal State, as connected with that of the rest of Italy, may be traced in Guicciardini, Muratori, Giannone, Sigonio, Sismondi, Botta, Bossi, and other historians of Italy. Muratori, in his 'Piena Esposizione dei Diritti Imperiali ed Estensi su Comâcchio,' has treated of the controversy concerning the various donations alleged to have been made to the Roman see. Cardinal Orsi has written 'Della Origine e del Dominio dei Romani Pontefici sopra gli Stati loro Temporali,' Rome, 1754. See also 'De la Puissance Temporelle des Papes,' Paris, 1812; and on the opposite side, in favour of the papal see, see De Maistre, 'Du Pape,' Paris, 1819.

PAPASQUIA'RO. [Mexican States.]

PAPA'VER, the name of a genus of plants of the natural family of Papaveraceæ, of which one of the species is celebrated for yielding Opium. The history of this, like that of many other cultivated plants, is little known, as well as the time when it began to be cultivated for the sake of its inspissated juice, though it was well known to the Greeks, and cultivated at very early periods on account of its seeds. (Theoph., lib. ix., cap. xiii., ed. Bodæus and Stapel, p. 1097.)

Some authors are of opinion that it is the μήκων of Dioscorides, and that the kind with black seeds was called ἀγρία, and that with white seeds ἥμερος; and that it is the juice of this plant which Hippocrates recommends under the name of ὀπὸς μήκωνος, or juice of the poppy. Pliny (xx., c. 18) uses *opium* to express the inspissated juice of the poppy. Sprengel, in his *Hist. Rei Herb.*, i., p. 176, quotes Diosc., lib. iv., c. 65, as referring to *Papaver somniferum*, and to *P. Rhœas*; but in his edition of that author (ii., p. 600) he mentions only the latter plant; hence we may infer that he conceives the former to have been unknown, as he nowhere else mentions it. We do not in this instance get the same degree of assistance as in many others from Arab authors. Opium is described by them under the name of *afeeyon*, while *apaynum* is quoted by Dr. Ainslie as its Sanscrit name. The poppy plant is described by the Arabs under the name of *Khushkhush*, while the Sanscrit is *chosa;* and the Persian and Hindee, *post*. The species of Papaver are chiefly found in European countries; but a few species extend to the Caucasus and Armenia, and one species grows in the Himalayas, though Egypt is the country where we find the earliest notice of the opium poppy. This species is now common in most parts of Europe, but having been so long cultivated, it may appear indigenous in many countries where it has only escaped from cultivation. It is, as is well known, extensively cultivated in India, but it can nowhere be seen in a wild state, as the climate is too hot to support it except for a few months in the year.

The genus Papaver has two convex deciduous sepals. Petals four. Stamens numerous. Style wanting. Stigmas four to twenty, radiating and sessile upon a disk which crowns the germen. Capsule obovate, one-celled, opening under the crown of the stigmas with short valves. Placentæ intervalvular, incomplete. Flower stalks inflexed at the apex before the flowers have expanded. The flowers of all are large and showy, but last a short time. Herbaceous plants abounding in milky juice.

The species are twenty-five in number, but few are remarkable for any useful properties. The English species are distinguished as having a rough and a smooth capsule: of the former, *P. hybridum* has an obovate globose capsule, and *P. argemone*, an elongated club-shaped capsule; of those with smooth capsules, *P. Rhoeas* and *P. dubium*, the former has a globose and the latter an oblong capsule.

Papaver somniferum, or the white poppy, is a native probably of Asia Minor, or of some part of the Persian region of botanists, but having been so long cultivated, it is found wild in many parts of Europe. The species is distinguished by its obovate or globular capsules, smooth as well as the calyx, the stem smooth and glaucous, leaves embracing the stem incised and repand, with subobtuse teeth. There are two distinct varieties, which by some botanists are considered to be distinct species: the dark, the red-flowered, and black-seeded is called by Gmelin *P. somniferum;* and the white-flowered with white seeds, *P. officinale*. The latter is characterised as having an ovate globose capsule; foramina under the stigma either none or obliterated; peduncles solitary. The former (*P. somniferum*) has globose capsules, opening by foramina under the stigma; seeds black: peduncles many. The flowers are usually red of different tints, though sometimes white. Dr. Royle states that he has seen only the white-flowered variety in the plains of India, and the red-flowered in the Himalayas, and both cultivated for the sake of the opium.

The poppy is cultivated in many parts of Europe on account of its seeds, which yield a bland oil much esteemed in France; and in this country chiefly on account of the capsules, which are used medicinally. It is extensively cultivated in Turkey and Asia Minor, Egypt, Persia, and India, on account of its inspissated juice, so well known as opium, though this is occasionally prepared also in Europe.

The cultivation of the poppy is very simple, though the weeding requires care, and the plants must not be crowded too much together. They are carefully watered and manured, the watering being more copious as the period of flowering approaches, and until the capsules are half grown.

In India the cultivation takes place in the cold weather, that is, during the winter of Europe. The collection of opium is commenced very soon after the flowers fall, as the capsules rapidly enlarge. The people go into the fields after sunset with small knives, usually with four crooked blades, with which they make either longitudinal or transverse incisions, and return in the morning to scrape off the opium which may have exuded, generally about one grain from each quadruple incision. But the quantity varies according to the soil, the cultivation, and the due management of the irrigation, as well as the quantity of dew deposited. When the wind is dry, or cloudiness prevents the formation of dew, the scarifications dry up, and little opium is exuded. When the dew is copious, it washes out the wounds in the capsule, and thus facilitates the running off of the milky juice. When the dew is moderate, the milk thickens in irregular tears, which are sometimes, as in a dry climate, allowed to adhere together, and dry in this state, forming the grain of opium. But in India the whole of the day's collection is rubbed together in a mortar or similar vessel, for the purpose of breaking down the grain so as to reduce the whole to a homogeneous semi-fluid mass, which should be dried as quickly as possible in the shade, and turned over very frequently.

Samples of all the opium brought for sale to the East India Company's opium factories are submitted to a steam drying process, by which the quantity of fluid in each is easily ascertained, and found often to amount to 30 per cent. These two methods of drying opium explain the accounts of different writers and travellers. Guibourt finds that Dioscorides, Kæmpfer, and M. Texier describe the opium as being pounded and mixed together, while Olivier and Belon describe it as being simply dried. The latter indeed describes opium as formed by the assemblage of the small tears gathered on the capsules. These two modes of preparation may be recognised in the opiums of commerce.

PAPA'VER. OPIUM, *Medical Properties of.*—The juice of the unripe capsule or fruit of the *Papaver somniferum* seems to have been used on account of its narcotic powers from a very early period, first in the East, of which it is a native, and afterwards in the West.

As to the two varieties of the *P. somniferum*, called *P. S. album*, in which the seeds are white, and the openings under the stigmata obliterated, and *P. S. nigrum*, in which the beds are blackish-grey, and the openings under the stigmas yellow, some differences are found in the relative proportion of some of the chemical constituents of the opium procured from them; but the *P. S. album* (*Papaver officinale*, Gmelin) is the kind chiefly cultivated in Persia and India.

'The first sophistication which the juice receives is that practised by the peasants who collect it, and who lightly scrape the epidermis from the shell to augment the weight. This operation adds about one twelfth of foreign matter. Thus collected, opium has the form of a glutinous and granular jelly. It is deposited in small earthen vessels, and beat up with saliva. On inquiring why water was not employed in the place of saliva, the answer was, that water caused it to spoil. It is afterwards enveloped in dry leaves, and in this state it is sold. The seeds of those poppies which have yielded opium are equally good for sowing the following year.' Such is the account by M. Ch. Texier, of the plan in Asia Minor. In India the juice is mixed with oil obtained from the seed of the poppy, to hinder the rapid drying of the juice. The produce of the first incisions is of a light yellow colour; the others are fainter in odour and darker coloured. In general all these gatherings are mixed together, and sent to market in small baskets. The quantity obtained varies not only with the soil and mode of cultivation, but also with the season and the time of collecting. In wet gloomy seasons not only is the quantity less, but it does not keep well; in such a case the proportion of morphia is also less. The quantity of morphia depends likewise very much on the time of gathering: if the harvest be postponed till the capsules begin to turn yellow and hard, it is greatly deficient; and by the time the capsules are mature and the seeds ripe, it has entirely disappeared. It is not, as in the case of many other vegetable alkaloids, transferred to the seeds, as they are altogether devoid of any narcotic principle, the oil which is obtained from them being bland and wholesome, and abundantly used as food; even the seeds themselves are freely eaten by birds, to which they are given (from the black variety), under the name of maw-seeds.

Several varieties of opium are met with in commerce, which may be noticed here in the order of their reputed excellence, the quantity of morphia contained in each being taken as the criterion.

1. Smyrna or Levant opium, which Mr. Pereira considers synonymous with Turkey opium; though German pharmacologists deem Turkey and Egyptian opium to be synonymous. (Th. Martius, *Pharmakognosie*.) 'It occurs in irregular roundish or flattened masses of various sizes, rarely exceeding two pounds in weight, enveloped in leaves, and intermixed with the reddish triangular capsules of several species of Rumex, such as R. orientalis, R. Patientia (which are employed to prevent the masses adhering to each other while the opium is soft). When first imported, the masses are soft, and of a reddish-brown colour; but by keeping they become hard and blackish; and on this account it is termed by the French opium noir. Its consistence is soft, at least of the interior, even when the exterior is very hard. Its fracture is waxy; the taste bitter, acrid, and persistent.'

2. 'Constantinople opium. Of this there are two sorts: one in large irregular cakes, which are flattened, like the Smyrna opium, and of very good quality; the other is in small flattened regular cakes, of a lenticular form, from 2 to 2½ inches in diameter, and covered with a poppy-leaf, the midrib of which divides the disk into two parts. It has an odour similar to the preceding kind, but more feeble; at first it is reddish both without and within, hence called by the French *opium rouge*; it however blackens and dries in the air, but never becomes so hard as Smyrna or Egyptian opium, than which it is more mucilaginous.' Th. Martius is of opinion that it is a manufactured article, prepared at Constantinople, out of Smyrna opium, by the addition of gum. It is a common article of German but rarely of English commerce. It is never covered with the Rumex capsules as the Smyrna opium.

3. *Egyptian* or *Alexandrian opium* 'occurs in round flattened cakes of about three inches in diameter, covered externally with the vestiges of the same leaf, which are in too mutilated a state to be determined. It is distinguished from the preceding varieties by its reddish colour, analogous to succotrine or hepatic aloes, which does not by time or exposure to the air become darker; the odour is fainter and somewhat musty. Though the cakes are of all the sorts much the hardest, so that a blow with a hammer will cause one to split into fragments, yet by exposure to the air it becomes soft.

4. 'Trebizond or Persian opium occurs in the form of cylindrical sticks, which by pressure have become somewhat angular. Their length is about six inches, their diameter about six lines. Each one is enveloped in a smooth glossy paper and tied with cotton. The colour of the opium is similar to that of succotrine aloes. It possesses a stronger odour than the Egyptian kind, but fainter than that of Smyrna, united with a musty one. The taste is intensely bitter.'

5. Indian opium, of which there are several varieties as already described. [Opium Trade.]

6. English opium 'is in flat cakes, enveloped in leaves. It resembles the Egyptian more than any other kind; its colour is that of hepatic aloes, with a moderately strong opiate odour.'

Before offering a summary of the points of difference, in chemical composition and other respects, of these various sorts, it is necessary to enumerate the general constituents of opium:—1, morphia; 2, codeia; 3, paramorphia or thebaine; 4, pseudomorphia; 5, narcotina or opianum; 6, narceine; 7, meconine; 8, meconic acid; 9, an oily acid; 10, gum; 11, resin; 12, extractive; 13, a fixed oil; 14, caoutchouc; 15, an odorous principle; 16, ligneous matter with inorganic salts, such as sulphate of lime and potass, &c. There are also various accidental but more intentional impurities, such as sand, of which even the best Smyrna opium contains a large portion; 10 ounces of opium frequently containing 10 drachms of stones and gravel. In the interior of the cakes leaden bullets are often discovered. The cakes should always be cut through the centre in order to detect this fraud.

The relative proportion of these numerous ingredients varies very much, not only in the samples from different countries, but in those of the same country. Thus Smyrna opium, though the average quantity of morphia which it yields may be stated to be 10 per cent., in five specimens examined by Mulder gave 10 per cent. in the best, and little more than 2 in the worst.

Professor Guibourt states Constantinople opium to yield only one half the quantity of morphia procurable from Smyrna opium; while Mr. Duncan of Edinburgh has obtained even 14 per cent. Guibourt also affirms that Egyptian opium yields only 3-7ths of the morphia obtainable from Smyrna opium; while Dr. Christison procured 10¾ per cent. from it. Of the Indian kinds Dr. Smyttan procured only 3 or 4 per cent. of morphia; while Dr. Christison obtained 8½ from the Malwa opium: and from Bengal opium Dr. Smyttan obtained 2 or 3½ per cent.; while Mr. Macfarlane of Edinburgh procured 7 per cent.

From English opium 5 per cent. may be obtained. From German opium Biltz procured 16½ to 20 per cent.; from some French opium Petit obtained 16 to 18 per cent., and Caventou the large amount of 22 to 28 per cent.

The extreme discrepancy of these results may be explained not merely by the varying seasons when the specimens were produced, and the different degrees of skill and dexterity in the chemists, but by the fact that the morphia is more easily and effectually separated when the opium is fresh; hence the large proportion found in European opium, which was not only cultivated with great care, but was analysed soon after it had been collected. It is not at all improbable that the morphia undergoes a change by age, and entirely evaporates from old specimens, in the same way as conia disappears from hemlock. [Conium.]

It is always proper to institute an examination into each new purchase of opium, to ascertain the presence and amount of morphia. Some specimens of opium, which to the eye present all the physical characters of the best Smyrna opium, even some of those deemed hitherto inimitable, such as the transparent agglutinated tears seen on cutting it across, are found on analysis devoid of the smallest trace of morphia. (*Journal de Pharmacie*, tom. xxiv., pp. 325, 446.)

The following test is proposed in the 'New Edinburgh Pharmacopœia,' and though not absolutely certain, is sufficiently so for common use. 'A solution from 100 grains, macerated 24 hours in two fluid ounces of water, filtered and strongly squeezed in a cloth, if precipitated by a cold solution of half an ounce of carbonate of soda in two waters, and heated till the precipitate shrinks and fuses, will yield a solid mass on cooling, which weighs, when dry, at least eleven grains; and if pulverised, dissolves entirely in solution of oxalic acid.'

More morphia would appear to be present in the specimens of European opium, which are obtained from the variety of poppy with violet-coloured petals, than in the Turkey opium; while that from the European white variety contains more narcotine than the Turkey. In Smyrna opium the morphia seems to be united with meconic acid, and to be not only more abundant, but more easily separated, and more completely purified from the narcotine and colouring matter, than that of Egypt, in which the morphia is united to sulphuric acid.

The great pains now taken in the culture and preparation of Indian opium will soon lead to a preference of it over the other kinds; and even now the specimens sent by Captain Jeremie surpass in purity and strength any which have ever been seen in this country, except some grown and prepared by Mr. Young of Edinburgh. If Indian opium contain generally more narcotine, it is on that account perhaps better suited to all cases in which the stimulating action is wished.

Good opium is not perfectly soluble in water; ¼th generally remains undissolved, consisting of the caoutchouc and resin. Constantinople opium however leaves no residuum of caoutchouc. When opium is entirely soluble in water, it may be suspected to have been prepared by boiling the bruised capsules and leaves, and it is of a very inferior kind. The specific gravity of good opium is 1·336, if great mechanical impurities are not present. It is very inflammable, and burns with a clear flame, and forms a transparent alcoholic solution: opium from the bruised capsules is not inflammable, and forms a turbid alcoholic solution. When gum arabic or tragacanth is used to adulterate it, the specimen forms, when rubbed with one part of alcohol and two of water, a tremulous gelatinous mixture.

The following table, by Mr. Pereira, will show at one view the principal characters of the crystalline constituents of opium:—

Tabular View of the Principal Characters of the Crystalline Principles of Opium.

Characters.	Morphia.	Codeia.	Narcotina.	Meconine.	Narceine.	Paramorphia, or Thebaine.	Pseudomorphia.
Taste . . .	Bitter	Bitter	Insipid	Rather acrid	Slightly bitter and metallic	Rather acrid and metallic	..
Fuses at . .	Above 240°	302°, or in boiling water	338°	194°, or in boiling water	198°, or in boiling water	302°	Hardly fusible
In cold water .	Nearly insoluble	Soluble in 80 pts.	Insoluble	Soluble in 265 pts.	Soluble in 375 pts.	Scarcely soluble	Almost insoluble
In boiling water .	Soluble in 100 pts.	In 17 parts	Slightly soluble	In 18 parts	In 230 parts	..	Almost insoluble
In cold alcohol .	Soluble in 40 parts	Soluble	In 100 parts	Soluble	Soluble	Soluble in 10 parts	Almost insoluble
In cold æther .	Sparingly soluble	Easily soluble	Easily soluble	Soluble	Insoluble	Very soluble	Almost insoluble
In caustic alkalies .	Soluble	Insoluble	Insoluble	Soluble	Insoluble	Insoluble, except in very concentrated solutions	Very soluble in potass and soda
Chlorine . .	..	..	..	Coloured blood-red	..	..	..
Iodine . . .	..	..	..	..	Coloured blue	..	..
Nitric acid . .	Coloured red	..	..	Yellow	If dilute, blue	Yellow	Coloured red
Hydrochloric acid .	..	..	..	..	Blue	..	..
Iodic acid . .	Iodine set free	..	..	..	..	..	..
Perchloride of iron	Coloured blue	..	..	..	..	..	Coloured blue
Infusion of galls .	Precipitate	Precipitate	Precipitate	..	..	..	..
Nitrogen . .	Present	Present	Present	Absent	Present	Present	Present
Water of crystallization . .	2 atoms	2 atoms	..	..	..	2 atoms	..
Atomic weight .	284	260	370?	90	254	284	306
Action on vegetable colours . .	Alkaline	Alkaline	No effect	No effect	No effect	Alkaline	..
Relation to acids .	Salifiable	Salifiable	Salifiable	Not salifiable	Not salifiable	Not salifiable	Not salifiable
Effects . .	Poisonous; a cerebro-spinant	A cerebro-spinant	Inert?	Inert?	Inert?	Causes convulsions	Not poisonous

It must be obvious that a substance of so complicated a nature cannot act uniformly on organised beings, even supposing them to be always constituted alike, which never is the case, since they vary according to age, constitution, habits of life, states of disease, and idiosyncrasy, &c. Some of the effects which follow the employment of opium have been attributed to one principle and some to another, but, with a few exceptions, nothing positive has been ascertained: morphia is by no means the only sedative principle, and narcotine, so long regarded as the stimulating principle, is, when pure, nearly if not quite inert. The odorous principle is unquestionably powerful, though it has no resemblance to hydrocyanic acid. The collectors of opium are generally pale and affected with tremblings. If opium be heated, the odour evolved is fatal to animals, and persons have fallen down in a state of insensibility from breathing an air charged with the vapour of opium in some pharmaceutical processes.

It is most probable that the extractive and resinous principles, with the meconic acid, which seems to modify the properties of the morphia, are the stimulating ingredients of opium, and that the getting rid of some or all of these, as in the watery extract of opium, and a few of the secret preparations of opium, constitute the superiority of these preparations, as calmants, over crude opium, or the officinal preparations in which they are retained.

A most extensive series of experiments have been instituted to determine the effects of opium: on vegetables by Marcet and Macaire, on animals by Charvet, and on man by numerous physiologists, including Charvet. From these it appears that opium acts as a poison to plants, by destroying their irritability. According to Charvet, in the case of the sensitive plant, where the opium failed to kill the subject of experiment, and it slowly recovered its irritability, yet the further growth was completely stopped. 'In the animal kingdom Charvet tried its effects on mammals, birds, reptiles, amphibia, fishes, insects (both in their perfect and larval states), the annelides, the mollusca, polypiphera, and polygastrica, and found that it acted on all as a poison, but with somewhat different effects according to their organization. Thus on man it may produce congestion of the brain (marked by sopor and apoplectic symptoms), or irritation of the brain and spinal marrow (indicated by convulsions and pain), or a sedative effect (manifested by paralysis).

In other mammals, two kinds of effects are seen for the most part; the one of irritation, the other of diminished nervous power, symptoms of congestion being altogether wanting or very slight. This difference of effect corresponds with a difference in the development of the brain.

In the invertebrated animals, no symptoms of irritation seem to be caused by opium. This poison in them acts only on the contractile tissues, and produces symptoms of weakness or loss of contractile power.

In the animal series, the action of opium varies with the degree of development of the nervous system; and in the lowest orders the effects are quite analogous to those observed in vegetables. (Pereira.)

Much disputation has taken place respecting the question, whether opium be a stimulant or a sedative; and most unnecessarily, as its action depends, in general, on the quantity taken, the frequency of repetition, and the state of the system when it is administered. That to persons in health, if the dose be small, it is a stimulant, seems unquestionable; and this is proved by the fact that the habitual opium-eaters consume it for the sake of its primarily stimulant effect, and not for the sake of the depression, languor, and suffering which succeed. The different degrees of action, resulting from a difference of dose, are so ably given by Mr Pereira, that they may be quoted here verbatim.

1. *First Degree of Operation.*—'In small doses, such as

from a quarter of a grain to one grain, opium generally acts as a stimulant, though in this respect the symptoms are not uniform. Usually the vascular system is somewhat excited, and a sensation of fulness is experienced about the heart. The excitement in the cerebral vascular system is accompanied by alterations in the condition of the nervous functions. The mind is exhilarated, the ideas flow more quickly, a pleasurable or comfortable condition of the whole system is experienced, which is difficult to describe; there is a capability of greater exertion than usual. These symptoms are followed by a diminution of muscular power, and of susceptibility to the impression of external objects; a desire of repose is experienced, with a tendency to sleep. While these effects are taking place, the mouth and throat become dry, and hunger is diminished, though the thirst is increased; and slight constipation usually follows.

'Such are the common effects of a small dose of opium on persons unaccustomed to its use; but by repetition the influence of this agent becomes remarkably diminished, and those therefore who resort to it for the purpose of producing a pleasurable stimulus are obliged to increase the quantity in order to keep up an equal effect.

2. *Second Degree of Operation.*—'Given in a full medicinal dose, such as two or four grains, the stage of excitement is soon followed by that of depression. The pulse, which at first is increased in fulness and frequency, is afterwards reduced below the natural standard. The skin becomes hot, the mouth and throat dry, the appetite diminished, the thirst increased, and frequently nausea or even vomiting is induced. The symptoms of excitement soon pass away, and a state of torpor succeeds; the individual feels indisposed to exertion, the muscular system appears enfeebled, the force of impressions on the organs of the senses is diminished, and the ideas become confused. This state is followed by an almost irresistible desire to sleep, which is frequently attended by dreams, sometimes of a pleasing, at others of a frightful nature.

'These effects are usually succeeded by constipation (which may continue for several days), by nausea, furred tongue, headache, and listlessness.

3. *Third Degree of Operation: Poisonous Effects of Opium*, as given by Dr. Christison.—'The symptoms of poisoning with opium, when it is administered at once in a dangerous dose, begin with giddiness and stupor, generally without any previous stimulus. The stupor rapidly increasing, the person becomes motionless and insensible to external impressions; he breathes very slowly, generally lies quite still, with the eyes shut and the pupils contracted; and the whole expression of the countenance is that of deep and perfect repose. As the poisoning advances, the features become ghastly, the pulse feeble and imperceptible, the muscles exceedingly relaxed, and, unless assistance is speedily procured, death ensues. If the person recovers, the stupor is succeeded by prolonged sleep, which commonly ends in twenty-four or thirty-six hours, and is followed by nausea, vomiting, giddiness, and loathing of food.'

The quantity which can produce a fatal effect in a person unaccustomed to its use is very small, even four grains; and in children, owing to the large quantity of blood which naturally goes to the brain, and the great impressibility of their nervous system, a very minute portion of opium, or of its numerous preparations, open or disguised, can produce death. These facts constitute a strong reason for unofficial persons refraining from its employment, and also for avoiding in this place all details connected with its medical use. It is undoubtedly one of the most important means of alleviating human suffering, when appropriately administered, and yet one of the greatest banes when abused. It is by the self-dosing in general that the practice of opium-eating is acquired; and it is the more necessary to warn such persons against commencing the use of it, even for the legitimate purpose of overcoming disease, as they may inadvertently lapse into habits which they may never be able to shake off. Further, it should be known by those who are disposed to adopt this practice, that the habitual consumers of this drug have recourse to it again and again, not so much for the sake of the pleasurable sensations it can excite, as to *escape the misery*, mental and bodily, which their previous indulgence has entailed upon them. Of these facts, the account of opium-eating among the Turks, as detailed by Dr. Oppenheim, are confirmatory:—

Turkish opium-eaters: Theriaki.—'The causes leading to the use of opium are many, and among them may be reckoned the following: long-continued diarrhœa, as a remedy for which opium is used in the first instance, and its use afterwards continued from habit; chronic coughs, in which opium is used as a popular medicine; habitual drunkards also frequently have recourse to opium, as a new stimulus, after they have abjured wine in some fit of repentance. Persons holding high offices or dignities in the state also have recourse to opium, when the preservation of their character forbids them the use of wine; some very strict believers also take opium as a restorative in cases of great exertion, as the Tartars (couriers), who travel with astonishing celerity.

'Opium-eaters generally begin with doses of from half a grain to two grains, and gradually increase the quantity till it amounts to two drachms and sometimes more a day; they usually take the opium in pills, but avoid drinking any water after having swallowed them, as this is said to produce violent cholic; to make it more palatable, it is sometimes mixed with syrups or thickened juices; but in this form it is less intoxicating, and resembles mead; it is then taken with a spoon, or dried in small cakes, with the words "Mash Allah" (the work of God) imprinted on them.

'The effect of the opium manifests itself one or two hours after it has been taken, and lasts for four or six hours, according to the dose taken and the idiosyncrasy of the subject. In persons accustomed to take it, it produces a high degree of animation, which the Theriaki represent as the acme of happiness.

'The habitual opium-eater is instantly recognised by his appearance. A total attenuation of body, a withered yellow countenance, a lame gait, a bending of the spine, frequently to such a degree as to assume a circular form, and glossy deep-sunken eyes, betray him at the first glance. The digestive organs are in the highest degree disturbed; the sufferer eats scarcely anything, and has hardly one evacuation in a week; his mental and bodily powers are destroyed,—he is impotent. By degrees, as the habit becomes more confirmed, his strength continues decreasing, the craving for the stimulus becomes even greater, and to produce the desired effect, the dose must constantly be augmented.

'When the dose of two or three drachms a day no longer produces the beatific intoxication so eagerly sought by the Opiophagi, they mix the opium with corrosive sublimate, increasing the quantity till it reaches ten grains a day; it then acts as a stimulant.*

'After long indulgence the opium-eater becomes subject to nervous or neuralgic pains, to which opium itself brings no relief. These people seldom attain the age of forty, if they have begun to use opium at an early age. The fasts in the month of Ramadan are for them fraught with the most dreadful tortures, as during the whole of that month they are not allowed to take anything during the day. It is said that to assuage their sufferings, they swallow, before the morning prayer, besides the usual dose, a certain number of other doses, each wrapped up in its particular paper, having previously calculated the time when each envelope shall be unfolded, and allow the pill to produce the effects of their usual allowance. When this baneful habit has become confirmed, it is almost impossible to break it off; the torments of the opium-eater, when deprived of this stimulant, are as dreadful as his bliss is complete when he has taken it; to him night brings the torments of hell, day the bliss of paradise. Those who do make the attempt to discontinue the use of opium, usually mix it with wax, and daily diminish the quantity of the opium, till the pill at last contains nothing but wax.'—(Dr. Oppenheim's *State of Medicine in Turkey*; *British and Foreign Medical Review*, October, 1837, p. 594.)

Coleridge.—'For ten years the anguish of my spirit has been indescribable, the sense of my danger staring, but the consciousness of my guilt worse, far worse than all!

'I have prayed, with drops of agony on my brow; trembling, not only before the justice of my Maker, but even before the mercy of my Redeemer.

'"I gave thee so many talents—what hast thou done with

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* Hence the name sometimes applied to such persons, '[illegible] yiyen,' 'swallowers of sublimate.' (Notes to 'Childe Harold,' Canto ii, Stanza [illegible].)

[illegible] the year 95 A.D. In the time of Confucius [illegible] bodkin, on the inner bark of the [illegible]. The Chinese paper has been supposed to be made [illegible] mistake; silk by itself cannot be reduced [illegible] suitable for making paper. Refuse silk is [illegible] occasionally used with other things, but the greatest part of the Chinese paper is made from the inner bark of the mulberry and some other trees, but chiefly from the bamboo. The Chinese also make paper from cotton and other rags, and a coarse yellow sort for wrappers is made from rice-straw. Only the second skin of the bark of the bamboo is used, which is beaten into a pulp with water. The Chinese can make sheets of a large size, the mould on which the pulp is made into paper being sometimes ten or twelve feet long, and very wide, and managed by means of pulleys. It is formed of fine threads of bamboo, as ours are of wire. To prevent the ink from running, the sheets are dipped into a solution of alum, which, as their ink is thicker than ours, is generally sufficient for the purpose, but sometimes isinglass is mixed with the solution of alum. (Du Halde's *China*, vol. ii. p. 415; Davis's *Chinese*, chap. xvii.)

Before the invention of paper the papyrus was in general use among European nations, but when the Saracens conquered Egypt in the seventh century, it could no longer be procured, and parchment became so dear that the writing on ancient manuscripts was erased to allow of their being re-written upon. [Palimpsest Manuscripts.]

The Arabians, in the seventh century, appear to have either discovered, or to have learned from the Chinese, the art of making paper from cotton; for it is known that a manufacture of such paper was established at Samarcand about the year [illegible] A.D. The Arabians seem to have carried the art to Spain, and to have there made paper from linen and hemp as well as from cotton. (*Journal of Education*, No. [illegible])

A person of the name of Tate is said to have had a paper-mill in Hertfordshire early in the sixteenth century; and another is said to have been established in 1588 at Dartford in Kent by a German, who was knighted by queen Elizabeth. Previously to this, and for some time afterwards, our principal supplies were from France and Holland. The making of paper in England had made little progress even so late as [illegible]. Fuller has the following remarks respecting the paper of his time:—'Paper participates in some sort of the character of the country which makes it; the Venetian being neat, subtle, and court-like; the French, light, slight, and slender; and the Dutch, thick, corpulent, and gross, sucking up the ink with the sponginess thereof.' He complains that the making of paper was not sufficiently encouraged, 'considering the vast sums of money expended in our land for paper out of Italy, France, and Germany, which might be lessened were it made in our nation.'

Thomas [illegible], a stationer, by the introduction of foreign improvements in [illegible], gave a great impulse to the manufacture of paper. Still, notwithstanding the great increase of demand and application of machinery, it was much retarded by the heavy duty of 3d. per pound on all writing and printing papers, accompanied with vexatious Excise regulations; and it was not till the reduction of the duty [illegible] that the manufacture could be said to be allowed fair play.

In the making of paper any fibrous vegetable substance [illegible] the inner bark of trees, the stalks of the [illegible] the leaves of the vine, the bine of the hop and [illegible] de-[illegible]. Some of the substances [illegible] for the making of ex-[illegible] been found to answer so [illegible] rags. The sweepings of the [illegible] is not fit [illegible] beaten into a suitable [illegible] substance [illegible] whether from the bark of [illegible] the general pro-[illegible] bruised in [illegible] filaments and [illegible] and [illegible] similar [illegible] fibrous [illegible] render [illegible] inter-[illegible] separate, with-

The rags of our own country do not constitute a fourth part of the quantity which we use in making paper. Italy and Germany furnish the principal supplies. They are imported in bags of about 4 cwts., each bag being marked in such a manner as to indicate the quality of the rags which it contains.

In every paper-mill the first business is to sort the rags and cut them into small pieces. This is done by women, each of whom is provided with a large knife to cut the rags. Threads and seams are carefully put by themselves: if ground with the cloth, they would form specks in the paper. The rags, when cut, are thrown in to five or six different compartments of a large chest, according to their quality. Only the finest linen rags are used for the best writing-paper, but cotton as well as linen rags are now used for printing-paper. A good workwoman can sort and cut about a hundredweight a day. Hempen rags are used for coarse papers, and old cordage and tarred ropes for brown wrapping-papers.

The rags are now to be washed, which is done either with hot water in a fulling-mill, such as is used for scouring cloth, or they are subjected for some hours to the action of steam. Formerly they were half rotted to prepare them for being more easily torn and beaten into a pulp. But in this process the fibre was partially destroyed, and the texture of the paper materially injured.

Previous to the important discovery that chlorine possesses the property of destroying all vegetable colours, paper-makers could only bleach their rags by subjecting them to various washings in alkaline leys, and by exposing them to the dew and light; and after all their pains they obtained a paper so imperfectly white that they were obliged to mask the defect by tinging it with a shade of blue. But now, by the proper application of chlorine, either in the form of the simple gas or in combination with [illegible] (chloride of lime), the colour can be perfectly discharged, and the paper rendered, if necessary, of the [illegible] white. Objections have been justly made to the improper application of chlorine in bleaching paper. Sometimes [illegible] applied in such quantity, or for such a time, as to injure the substance of the fibre, and sometimes the paper, after [illegible] made, is bleached with chlorine in such a manner that the ink turns brown, and there have been instances in which the colour has been nearly discharged altogether, leaving the sheet almost as it was before it was written or printed [illegible]. But we believe it is now generally admitted that [illegible], judiciously applied, is not in the smallest degree injurious to the paper, or liable, in any length of time, to alter the colour of the ink.

The rags, after being washed, are subjected to the action of a revolving cylinder, the surface of which is furnished with a number of sharp teeth or cutters, which are so placed as to act against other cutters fixed beneath the cylinder. The rags are kept immersed in water, and subjected to the action of the cutters for several hours till they are minutely divided and reduced to a thin pulp. During [illegible] process a quantity of the chloride of lime or of chlorine [illegible] is mixed with the rags, by which the pulp is rendered perfectly white.

The pulp, or *stuff*, as it is technically called, is now ready to be made into paper, which is done either by hand or [illegible] machine. We shall first describe, as briefly as we can, [illegible] process of making paper by hand. We shall not enter [illegible] any niceties of detail, which, in such things, are of no use [illegible] those who understand the art, and of very little to [illegible] who do not. A clear view of the details can only [illegible] obtained by actual inspection.

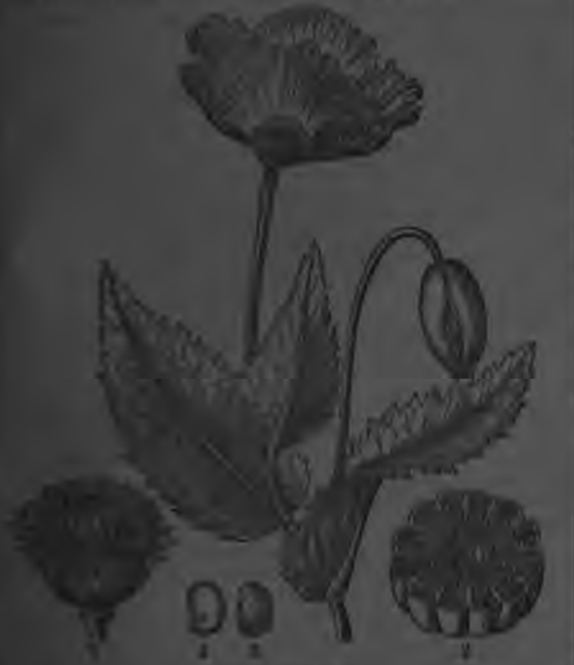
The stuff is put into a large vat, and is kept at a proper temperature either by a stove or steam-pipe, and the [illegible] matter is held in even suspension by a continual [illegible] carried on in the vat by means of what is technically called a *hog*, or by other improved apparatus.

The paper is made with a *mould* and *deckle*. The mould is a shallow square *frame* covered with wire-cloth, a little larger than the sheet intended to be made up[illegible]. The wire-cloth is now generally woven in a loom like cloth, and makes no wire-marks on the paper; but the [illegible] fashioned wire-cloth consists of a number of parallel wires stretched across the frame, very close together, and crossed at right angles by other stronger wires about an [illegible] apart. These thicker wires make the wire-marks of the paper, the stuff being there thinner than on the rest of the sheet. The deckle is a very thin frame of wood which [illegible]

Pereira, in *Medical Gazette*; and Holland, *Medical Notes and Reflections*.)

PAPAVERACEÆ, so called after the subject of the preceding article, form a small natural order of Exogens, readily known by their deciduous calyx, usually tetramerous flowers, indefinite hypogynous stamens, and parietal placentæ; added to which, they have leaves without stipules, and their stems discharge a turbid white, yellow, or orange-coloured juice when wounded. Their seeds moreover contain a bland oil, lodged in a copious albumen, within which is situated a minute embryo. They consist for the most part of herbs, which are usually of only annual duration; but a few are shrubby, the most remarkable case of that kind being a genus called Dendromecon, a native of California, which is a true shrub, with the aspect of a Cistus. The greater part of the species inhabit the temperate parts of the Old World; but a few also occur in Australia, at the Cape, and in North America. Their active qualities are usually dangerous, but are for the most part of little moment, except in the case of the Papaver somniferum, or Opium Poppy [PAPAVER], the properties of which have been already noticed. It is however probable that in most cases the milky juice is narcotic and the oil of the seeds harmless: an apparent exception to the latter statement occurs in Argemone mexicana, whose seeds are said to be narcotic, especially when smoked; but it is probable that in this case it is in the coats of the seed that the poisonous principle resides, rather than in the oil itself.

Some Papaveraceæ have no petals, as Bocconia, thus corresponding with Thalictrum and other apetalous Ranunculaceæ, with which order they are closely connected through Platystemon, a Californian annual with disjoined carpels. (Lindley's *Natural System*, p. 7; Endlicher, *Genera Plantarum*, p. 852; and Dierbach's *Arzneikräfte*, p. 31.)

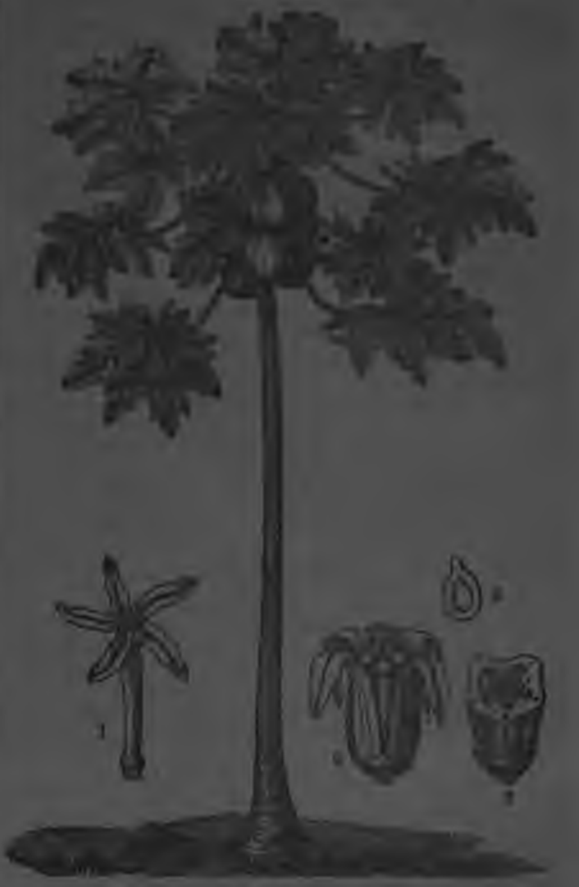


Papaver somniferum.

1, the stamens and pistil; 2, a transverse section of the capsule; 3, a seed; 4, the same cut in half, so as to show the embryo.

PAPAW. [CARICA.]

PAPAYACEÆ, so called from Carica Papaya, the principal species, of which a full account has already been given [CARICA], are a very small natural order of Exogenous plants, consisting of the genus Carica alone, and apparently allied to Cucurbitaceæ and Passifloraceæ, with the former of which it corresponds in its gourd-like fruit, with parietal placentæ, and in its diclinous sexes; while it approaches the latter also in placentation, in its superior succulent fruit, and in the structure of its seeds. The order is remarkable as an exception for having monopetalous male flowers and polypetalous females, and in its vegetation for its simple unbranched stems, growing only by the gradual development of a terminal bud. For a full account of the Papaw tree the reader is referred to CARICA.



Carica Papaya.

1, a monopetalous male flower; 2, a polypetalous female flower; 3, a transverse section of the ovary; 4, a longitudinal section of a seed.

PAPENBURG is a flourishing town in the lordship of Meppen and the province of Osnabrück, in 53° 33′ N. lat. and in 7° 25′ E. long. Towards the end of the seventeenth century a few Germans formed a small settlement on the neighbouring moors for the purpose of digging and selling peat, which by degrees has become a place of great trade. A canal seven miles in length, connected with several others, runs through the Drosler Syhl (which is the harbour of the Papenburg ships) into the Ems. The town contains two Roman Catholic churches, three schools, and between 400 and 500 houses. The inhabitants, 3600 in number, gain their livelihood chiefly by ship-building and navigation: they build annually about 60 ships for East Friesland, as well as for their own use, and have one hundred ships of their own, from eighty to ninety tons burden, manned with 6 or 7 men, each of which, when first launched and equipped for sea, is worth 10,000 or 12,000 Dutch florins. During the French revolution several hundred ships sailed under the neutral flag of Papenburg. Besides saw-mills, sail-cloth, and rope manufactories, there are some brandy distilleries and lime-kilns: the quantity of peat annually dug on the moors is very great, and it forms an important article of export to the ports of the Baltic and the German Ocean.

PAPER. In early times the materials used for writing upon were chiefly such as only required some little mechanical fashioning to fit them for that purpose. Characters were engraved on flat stones made smooth, or were impressed in clay, which was afterwards dried and hardened by sun or fire, as in the Babylonian bricks. Thin boards of wood covered with wax or some similar composition, and plates of ivory and of metal, have been used; but a more convenient material was afforded by the leaves of some species of trees. The skins and intestines of animals have also been made fit for writing upon; but wherever the Egyptian papyrus was introduced, all these things fell into disuse, except parchment, which is still preferred for certain purposes. [PARCHMENT; PAPYRUS.]

The art of making paper from fibrous matter reduced to a pulp in water appears to have been first discovered by the

Chinese about the year 95 A.D. In the time of Confucius they wrote with a style, or bodkin, on the inner bark of the bamboo. The Chinese paper has been supposed to be made of silk, but this is a mistake; silk by itself cannot be reduced to a pulp suitable for making paper. Refuse silk is indeed occasionally used with other things, but the greatest part of the Chinese paper is made from the inner bark of the bamboo and some other trees, but chiefly from the bamboo. The Chinese also make paper from cotton and linen rags, and a coarse yellow sort for wrappers is made from rice-straw. Only the second skin of the bark of the bamboo is used, which is beaten into a pulp with water. The Chinese can make sheets of a large size, the mould on which the pulp is made into paper being sometimes ten or twelve feet long, and very wide, and managed by means of pulleys. It is formed of fine threads of bamboo, as ours are of wire. To prevent the ink from running, the sheets are dipped into a solution of alum, which, as their ink is thicker than ours, is generally sufficient for the purpose, but sometimes fish-glue is mixed with the solution of alum. (Du Halde's *China*, vol. ii., p. 415; Davis's *Chinese*, chap. xvii.)

Before the invention of paper the papyrus was in general use among European nations, but when the Saracens conquered Egypt in the seventh century, it could no longer be procured, and parchment became so dear that the writing of antient manuscripts was erased to allow of their being re-written upon. [PALIMPSEST MANUSCRIPTS.]

The Arabians, in the seventh century, appear to have either discovered, or to have learned from the Chinese, the art of making paper from cotton; for it is known that a manufactory of such paper was established at Samarcand about the year 706 A.D. The Arabians seem to have carried the art to Spain, and to have there made paper from linen and hemp as well as from cotton. (*Journal of Education*, No. 10.)

A person of the name of Tate is said to have had a paper-mill at Hertford early in the sixteenth century; and another is stated to have been established in 1588 at Dartford in Kent, by a German, who was knighted by queen Elizabeth. Previously to this, and for some time afterwards, our principal supplies were from France and Holland. The making of paper in England had made little progress even so late as 1662. Fuller has the following remarks respecting the paper of his time:—'Paper participates in some sort of the character of the country which makes it; the Venetian being neat, subtle, and court-like; the French, light, slight, and slender; and the Dutch, thick, corpulent, and gross, sucking up the ink with the sponginess thereof.' He complains that the making of paper was not sufficiently encouraged, 'considering the vast sums of money expended in our land for paper out of Italy, France, and Germany, which might be lessened were it made in our nation.'

Thomas Watson, a stationer, by the introduction of foreign improvements in 1713, gave a great impulse to the manufacture of paper. Still, notwithstanding the great increase of demand and application of capital, it was much retarded by the heavy duty of 3*d.* per pound on all writing and printing papers, accompanied with vexatious Excise regulations; and it was not till the reduction of the duty to 1½*d.* per pound on all kinds that the manufacture could be said to be allowed fair play.

In the making of paper any fibrous vegetable substance may be used, as the inner bark of trees, the stalks of the nettle, the tendrils of the vine, the bine of the hop, and even wheat-straw, upon paper made from which a book describing the process was published. Some of the substances mentioned answer well enough, but the making is too expensive. Nothing however has yet been found to answer so well as linen, hempen, or cotton rags. The sweepings of the cotton-mills are also much used. Woollen cloth is not fit for the purpose, because it cannot be beaten into a suitable pulp, and gives a hairy texture to the surface.

In all kinds of paper-making, whether from the bark of trees or other fibrous matter, or from rags, the general process is the same. The fibrous material is cut and bruised in water till it is separated into fine and short filaments, and becomes a sort of pulp. This pulp is taken up in a thin and even layer upon a mould of wire cloth, or something similar, which allows the water to drain off, but retains the fibrous matter, the filaments of which are, by the process of reduction to pulp and subsequent drying and pressing, so interwoven or felted together that they cannot be separated without tearing, and thus form paper.

The rags of our own country do not constitute a fourth part of the quantity which we use in making paper. Italy and Germany furnish the principal supplies. They are imported in bags of about 4 cwts., each bag being marked in such a manner as to indicate the quality of the rags which it contains.

In every paper-mill the first business is to sort the rags and cut them into small pieces. This is done by women, each of whom is provided with a large knife to cut the rags. Threads and seams are carefully put by themselves: if ground with the cloth, they would form specks in the paper. The rags, when cut, are thrown in to five or six different compartments of a large chest, according to their qualities. Only the finest linen rags are used for the best writing-paper, but cotton as well as linen rags are now used for printing-paper. A good workwoman can sort and cut about a hundredweight a day. Hempen rags are used for coarse papers, and old cordage and tarred ropes for brown wrapping-papers.

The rags are now to be washed, which is done either with hot water in a fulling-mill, such as is used for scouring cloth, or they are subjected for some hours to the action of steam. Formerly they were half rotted to prepare them for being more easily torn and beaten into a pulp. But by this process the fibre was partially destroyed, and the texture of the paper materially injured.

Previous to the important discovery that chlorine possesses the property of destroying all vegetable colours, paper-makers could only bleach their rags by subjecting them to various washings in alkaline leys, and by exposing them to the dew and light; and after all their pains they only obtained a paper so imperfectly white that they were obliged to mask the defect by tinging it with a shade of blue. But now, by the proper application of chlorine, either in the form of the simple gas or in combination with lime (chloride of lime), the colour can be perfectly discharged, and the paper rendered, if necessary, of the purest white. Objections have been justly made to the improper application of chlorine in bleaching paper. Sometimes it is applied in such quantity, or for such a time, as to injure the substance of the fibre, and sometimes the paper, after it is made, is bleached with chlorine in such a manner that the ink turns brown, and there have been instances in which the colour has been nearly discharged altogether, leaving the sheet almost as it was before it was written or printed upon. But we believe it is now generally admitted that chlorine, judiciously applied, is not in the smallest degree injurious to the paper, or liable, in any length of time, to alter the colour of the ink.

The rags, after being washed, are subjected to the action of a revolving cylinder, the surface of which is furnished with a number of sharp teeth or cutters, which are so placed as to act against other cutters fixed beneath the cylinder. The rags are kept immersed in water, and subjected to the action of the cutters for several hours till they are minutely divided and reduced to a thin pulp. During this process a quantity of the chloride of lime or of chlorine gas is mixed with the rags, by which the pulp is rendered perfectly white.

The pulp, or *stuff*, as it is technically called, is now ready to be made into paper, which is done either by hand or by machine. We shall first describe, as briefly as we can, the process of making paper by hand. We shall not enter into any niceties of detail, which, in such things, are of no use to those who understand the art, and of very little to those who do not. A clear view of the details can only be obtained by actual inspection.

The stuff is put into a large vat, and is kept at a proper temperature either by a stove or steam-pipe, and the fibrous matter is held in even suspension by a continual motion carried on in the vat by means of what is technically called a *hog*, or by other improved apparatus.

The paper is made with a *mould* and *deckle*. The mould is a shallow square frame covered with wire-cloth, and a little larger than the sheet intended to be made upon it. The wire-cloth is now generally woven in a loom like cloth, and makes no wire-marks on the paper; but the old-fashioned wire-cloth consists of a number of parallel wires stretched across the frame, very close together, and crossed at right angles by other stronger wires about an inch apart. These thicker wires make the wire-marks of the paper, the stuff being there thinner than on the rest of the sheet. The deckle is a very thin frame of wood which fits slides upon the mould, and is required to retain the stuff on the mould and to limit the size of the sheet.

The *dipper*, or *vatman*, inclining the mould a little towards him, dips it into the vat with the deckle upon it, and lifts it up again horizontally. He shakes it to distribute the stuff equally, and the water drains through the wire. He lays the mould on the edge of the vat and takes off the deckle, which he requires to apply to another mould. After remaining two or three seconds to drain, the mould is taken by another workman, the *coucher*, who, having deposited the sheet of paper upon a felt, or piece of woollen cloth, returns the mould to the dipper, who in the meantime has made another sheet, which stands on the vat ready to be couched upon another felt spread over the former sheet. Thus they proceed till they have made a pile of sheets, called a *post*, consisting of six or eight quires. This post, with its felts, is placed in the *vat-press*, and subjected to a strong pressure to force out the superfluous water, and to give firmness and solidity to the paper. The pile is then removed from the vat-press, the felts taken out, and the sheets are pressed again by themselves. They are then taken from the press, and hung up, five or six together, in the *drying-room*.

The paper is now made, and only requires finishing, but the greater number of the finishing processes are only required for writing-paper, common printing-paper and wrapping-papers being ready for packing up when dried.

Writing-paper is dipped, five or six sheets together, into a tub of size, and afterwards pressed to force out the superfluous size. It is then hung up again in the drying-room. Printing-paper is sized in the stuff. Every sheet is now examined, imperfections removed, and bad sheets taken out. A large pile of paper is then made, and pressed with great force to render the sheets quite flat and smooth. The pile is then taken down sheet by sheet, and another made, by which new surfaces are brought into contact with each other, and the pile again pressed strongly. This operation, which is called *parting*, is done two three times for the best papers. The paper is now counted into quires, folded, and packed up into reams.

The size is made from skins and other animal substances, and is required to prevent the ink from spreading among the fibres by capillary attraction. Blotting-paper is not sized.

The paper-making machine is constructed in such a manner as to imitate, and in some respects to improve, the processes used in making paper by hand; but its chief advantages are, that paper can be made of any size which can practically be required, and with a degree of rapidity which leaves the other mode of making it at an immeasurable distance. As much as 25 square feet can be made in a minute, and consequently 15,000 square feet in a working day of ten hours.

The paper-making machine was invented by Mr. Fourdrinier, and as now used, with the improvements applied to it by himself and others, is, in the simplicity and ingenuity of its contrivances, not surpassed by any other in the whole range of British machinery.

We will describe the process of making paper by the machine as briefly as we can, referring those who wish for more minute information to an article in No. 96 of the 'Penny Magazine,' which is accompanied by a large wood engraving of the machine itself.

The pulp is first made to flow from the vat upon a wire strainer, or sifter, which moves rapidly up and down so as to force the fine filaments of the pulp through the wire, whilst it retains any knots or other unsuitable matter. Having passed through the sifter, the pulp flows over a ledge in a regular and even stream, and is received upon an endless web of wire-gauze, which presents an uninterrupted surface of five or six feet long. The wire-web moves forward with a motion so regulated, as, taken in connection with the quantity of pulp allowed to flow upon it, to determine the thickness of the paper. At the same time a shaking motion is given, from side to side, to the wire web, which assists to spread the pulp evenly, and also to facilitate the separation of the water, which passes through the wire; by which means the pulp solidifies as it advances, and is at the same time prevented from flowing over the sides by straps which regulate the width of the paper. Before the pulp, now so [illegible], quits the plane of wire, it is pressed by a roller covered with felt, and is then taken up by an endless web of felt, which forms an inclined plane, and gradually moving forward absorbs a further portion of the moisture. The pulp is now raised by a pair of rollers, between which it is pressed, and then it passes upon another inclined plane of felt, which conducts it to another pair of pressing rollers. The pulp is now become paper, and only requires to be made dry and smooth. To effect these objects the machinery conducts it over the polished surface of a large cylinder heated by steam. From this cylinder it passes to a second, larger and hotter, and then to a third, which is still hotter than the second. After this it is subjected to the pressure of a woollen cloth, which confines it on one side while the cylinder smooths it on the other. It is then conducted by another roller to a reel, on which it is wound, perfectly dry and smooth, and ready to be cut into sheets for use. In two or three minutes the pulp, which is introduced upon the wire web at one extremity of the machine, is delivered at the other in the state of perfect paper.

In printing-paper the size is commonly added to the pulp, but writing-paper is sized after the sheets are cut, as in hand-made paper.

The paper, after it is cut, is examined, to remove knots or specks, and to put aside damaged sheets. It is then counted into quires of 24 sheets and folded, and lastly put up into reams of 20 quires, pressed in the reams, and tied up in wrappers for sale.

Machines for cutting the paper into sheets of any size which may be required, have been invented by different persons. They are separate from the paper-making machine, and are beautiful contrivances, but too complicated for description without the assistance of engravings.

In most of the Fourdrinier machines a partial vacuum is produced under the endless wire-web by means of large air-pumps. The atmosphere is thus made to press upon the pulp, and the moisture is forced through the wire. Owing however to the change of stroke of the pistons, a uniform degree of vacuum cannot be maintained, so that the pulp receives various degrees of pressure, and consequently the paper is made of unequal thickness. To remedy this defect, by rendering the vacuum as uniform as possible, two patents were taken out in 1839, one of which proposes to effect the purpose by substituting a revolving fan for the air-pump, and the other by using hydraulic air-pumps working on the principle of gas-holders, instead of the common ones.

Various patents have been taken out for improvements in parts of the machinery, or for other machinery to be applied in various stages of the process. One was taken out by Mr. Dickinson for an apparatus to separate the knots and lumps from the pulp, by making it pass through the periphery of a revolving cylinder constructed of an endless spiral wire attached to metal bars. Other improved processes for the same purpose have been invented. A patent was taken out by Messrs. Towgood and Smith, the object of which is to apply the size to the paper as it comes in a continuous sheet upon the endless wire-web. The operation in this apparatus is performed by rollers, the surfaces of which are supplied with size, which is transferred from them to the newly-made paper as it passes between the rollers. Mr. Dickinson has also a patent for uniting two layers of pulp in order to produce paper of an extraordinary thickness. The combination of two or more sheets of pulp has been long employed in the making of thick drawing-paper and Bristol boards by the process called couching, but Mr. Dickinson's contrivance affords the means of doing it in a common paper-making machine.

Various wire-marks, or water-marks, as they are called, were formerly applied to paper to distinguish it. On the paper used by Caxton and the other early printers, these marks consisted of an ox-head and star, a collared dog's head, a crown, a shield, a jug, &c. A head with a fool's cap and bells gave name to the paper called foolscap, and post paper seems to have derived its name from the mark of a horn, which was formerly carried by the postman, and blown to announce his arrival. Hand-made paper is now commonly marked with the name of the maker, and the date of the year when it was made.

PAPER TRADE. The manufacture of paper being a branch of industry which does not necessarily call for the employment of any large capital, is carried on in every country, and consequently from no one is there any considerable exportation. England is perhaps better qualified than any other country for the cheap production of paper, because of the successful application to that purpose of extensive machinery; but this great advantage is to some extent counterbalanced by the impediments thrown in the way by Excise regulations, and the shipments are consequently in great part confined to our own colonies and foreign possessions. In the account of exports kept at the Custom-House, paper is not distinguished from other articles of stationery, but it necessarily forms the greatest part of the articles entered under that name. The total value of stationery exported in 1837 was 198,349*l.*, and of this sum the large proportion of 136,424*l.* was made up of shipments to our foreign possessions. It was shown by an account produced before the Commissioners of Excise Enquiry in 1835 that the weight of paper of all kinds exported in the previous year did not much exceed 4 per cent. of the quantity made.

Until 1837 the duty on paper was charged in two classes. That made wholly out of old tarred rope, without extracting the pitch or tar, was considered as second-class paper, and paid only a duty of 1½*d.* per lb., while paper made of all other materials was considered as first class paper, and was charged with a duty of 3*d.* per lb. In the year above mentioned this distinction was abolished, and the duty on all kinds of paper was fixed at 1½*d.* per lb., which gave an immediate impulse to the trade. The effect of this change in augmenting the quantity used may be seen from the following figures:—

The quantity of paper of each class made in the United Kingdom in 1835 and 1836 was as follows:—

	1835. lbs.	1836. lbs.
First class .	56,179,555	66,202,689
Second class .	17,863,095	15,906,258
Total .	74,042,650	82,108,947

The quantity made in the two following years, when the classification was abolished, was—

1837 .	88,950,845 lbs.
1838 .	93,466,286

The duty collected in each of these years was—

1835 . .	£813,688
1836 . .	751,113
1837 . .	555,942
1838 . .	584,164

The rates of duty chargeable on the importation of paper from any foreign country are:—

On brown paper made from old rope	3*d.* per lb.
other kinds of paper . .	9*d.* "
paper-hangings . . .	1*s.* per sq. yd.

These duties are nearly nominal, as with the exception of some particular kinds of drawing-paper, of which a small quantity finds its way, and paper-hangings, which are imported on account of the elegance of their patterns, all the paper used within the United Kingdom is of home manufacture.

PAPER MULBERRY. [BROUSSONETIA.]

PAPER NAUTILUS, or **PAPER SAILOR,** the popular English names for the Ναυτίλος (Nautilos) or Ναυτικὸς (Nauticos) of Aristotle (*Hist. Anim.*, iv. i.); *Argonauta* of Linnæus. This animal has been from the earliest periods an object of great interest to zoologists, on account of the romantic accounts of its sailor-like habits handed down to us from the antients—we need only refer to the accounts of Aristotle, Pliny, Ælian, Oppian, and others—and in consequence of the difference of opinion entertained with regard to the inhabitant of the shell by naturalists; some holding that the cephalopod found in it was a mere parasite, or, even worse, a pirate that had destroyed the legitimate owner and possessed himself of the shell; and others, that the animal was the lawful possessor and original constructor of it.

Among those who supported the former opinion were Lamarck, De Montfort, Ranzani, Poli, and De Ferrussac, to say nothing of Cuvier, the inclination of whose mind evidently was that the shell belonged to the animal, though he only designates the opinion of those who held the contrary as extremely problematical. Professor Owen appears to have been early inclined to this view of the subject. Dr. Leach, M. Rafinesque, M. de Blainville, and Mr. Gray, stand conspicuous among those who denied that the *Ocythoe* found in the shells of the genus *Argonauta* of Linnæus was the constructor of the shell.

The reasoning of those who held that the Argonautic cephalopod was the constructor of the shell appears to have been based upon the numbers found always fitting the shell, and, in the case of Poli and De Ferrussac, upon the supposed discovery of the animal *and shell* in the egg.

Those who opposed these views, or still doubted (and we confess that we were among the latter, thinking it highly probable that the animal would be found to bear a strong resemblance to *Carinaria*), were struck with the supposed anomaly which would be manifested if the cephalopod remains were the natural inhabitant. Evidence that the animal was not affixed to the shell had been given over and over again till it became largely cumulative, and had never been controverted. The animal had been seen to quit it when alive, and to fall out when dead by its own weight upon reversing the shell. How then was the shell to be secreted? Again, the specimens found in the greater majority of the shells were apparently females, and placed upon a great mass of eggs which filled up, at least, all the spiral part of the shell; and on these the body of the animal rested. An *Octopus*, nearly allied to *Ocythöe*, was caught in the Madras Roads with its ventricose body firmly imbedded in a ghee-bowl; and *Octopus arenarius* had been found in a *Dolium*. These and other facts, with which we will not weary the reader, seemed very powerful; but if any credence is to be given to the carefully conducted experiments of the lady whose valuable observations we shall now proceed to notice (and, after a strict scrutiny, we see no reason to view them with the slightest suspicion), the question *is* now set at rest, though it was *not* by Poli, who must, if this lady's experiments were correctly made and accurately reported, have been in error when he supposed that he saw the animal *and shell* in the egg.

In 1836 Madame Jeannette Power laid before the academy at Catania her 'Osservazione fisiche sopra il Polpo dell' Argonauta Argo,' in which, after a long and careful course of inquiry, she declared the following results:—1st, that the cephalopodous mollusk usually found therein is the constructor of the shell which it inhabits; 2nd, the clearing up of the doubts with regard to the first development of its eggs; 3rd, new facts respecting its habits.

In order to obtain the data from which Madame Power came to her important conclusions, she had cages constructed which were eight palms long and four broad, with a convenient interval (three or four lines) between the bars, which allowed the water to enter freely when placed in the sea, whilst the escape of the animal was prevented. Madame Power placed these cages in a shallow bottom in the sea near the citadel of Messina, where she could examine them undisturbed, and enclosed in them a number of living Argonauts, which she supplied every two or three days with food, consisting of naked and testaceous mollusks.

The following is this lady's description of the cephalopod of the Argonaut:—'It is furnished with eight arms, having on each two rows of suckers: the first two arms are more robust than the others, and should be so, because they serve as masts to support the sails, which, spread out, act before the wind as such. At the base they have on the inferior sides the double row of suckers, like the other six; but from the inferior row, at about an inch from the base in adults, a rather furrowed membrane begins to develop itself, which extends as far as the tip of the arm, and holding it bent, it can no longer execute the office of a rowing arm, but is employed by the animal as a sail. These sails are so large, that when turned backwards and pressed against the shell, they can entirely cover and protect it. Thus, as far as I can conclude, the true office of these sails is exactly that of keeping themselves applied to the shell at all times, in reserve for the moment when the animal, coming to the surface of the water, removes them, and spreading them, raises them as sails. In fact, the series of suckers of the sail-arms, when the membrane of the sails is wrapped about the shell, is placed exactly over the keel of it in such a manner that each sucker corresponds to each point in which the ribs of the shell terminate until they reach the two margins of the spiral.'

Madame Power compares these *sails* with the two wing-like lobes of the mantle of *Cypræa* [CYPRÆIDÆ, vol. viii. p. 254], not only from the manner in which they cover the shell, but because she has reason to believe that the formation of the shell is the result of a transudation from the membrane of the sails, the corrugations of which, in secreting the calcareous matter, may be the cause of the ribbed form of the shell.

This consideration, she remarks, may weigh in obviating the difficulties of those who cannot imagine how a shell containing a cephalopod should present no resemblance with the folds of the animal compressed within it. For if they would consider it the result of a calcareous deposition of the membrane of the sails, they would find not only the series of little points corresponding to the suckers, which shape themselves in the keel of the spiral, but an explanation of the deposition of the ribs, and of the smooth and paper-like condition of the shell.

The sail, when spread out, presents, according to Madame Power, a silvery surface, speckled with concentric circles of spots, with a black spot in the middle, surrounded with a beautiful gold colour; this and the vicinity of the suckers along the keel and the spiral assume a purple colour so vivid that it approaches that of the *Ianthina*. The mouth, the head, the bag, and the branchiæ, did not present Madame Power with any novelty beyond what had been already well described by naturalists, and which is common to the *Cuttles* and the *Calamaries*; but she makes two observations with regard to the funnel, which she believes to be new. 1st, that it fulfils the office of a pump or proboscis rather than that of a funnel, and that the animal employs it, when swimming with its arms on the surface of the water, as a helm, elongating it in front of the widest part of the shell, at the same time that the spiral serves as a prow.*

'Reflecting,' says Madame Power, 'on the delicacy and fragility of the shells, and wishing to trace the cause of their being so rarely seen broken, I determined to touch one whilst its poulp or animal was within; and taking it dexterously between my fingers, to learn what degree of flexibility it would admit, I discovered that it was extremely elastic, so much so as to admit of the two extremities of the great curve being brought in contact without breaking; and indeed shells so fragile ought to possess this flexibility, in order that they might not be continually liable to be broken in pieces by the restless and uninterrupted movements of their poulps, as well as by the shocks which they would be likely to suffer in the depths during a stormy sea. In this case it would prove very unfortunate for them, as they are not capable of forming an entire new shell.'

'Having ascertained the flexibility of the shell whilst the living animal was within, I immersed some empty ones which had been exposed to the air for some time in fresh water, and, at the end of three days, found them as pliant and flexible as at first.'

'As regards the connection between the animal and the shell in which it is lodged, I have not found any ligament or muscle which connects them; while the pot is simply held by the turning of the end of the spiral, from which it may be easily separated; and it appears that the tight adhesion of the sac against the internal surface of the ribs of the shell is sufficient to hold it attached. Moreover the external superposition of the sail-arms keeps the shell firmly upon the poulp.'

Habits, &c.—Madame Power states that *Argonauta Argo* in its natural state is to be found in the neighbourhood of Messina, and even in the port, almost all the year through, in larger or smaller numbers. Their true season she considers to be autumnal, or in the months of September, October, and November. It may be, in her opinion, either because the current brings them at that time, or that food is more plentiful, or because it may be the season of their fecundation. They are seen in the most muddy parts of the port, and where the anchored boats lie thickest. When the Argonauts swim on the surface of the water, if they observe any person, they fold the sail-arms over the shell and stow the swimming-arms inside it; then they sink to the bottom. If they are beneath the surface, they eject ink, like other cephalopods, to make the water turbid, thus gaining time to hide themselves in the mud.

Those in the cage, when closely pursued, would, after spending their ink, spirt out water from the tube, and then shrink into the shell, which was covered with the sails. At first the appearance was silvery, but instantly afterwards a purple colour would spread along the suckers over the whole of the keel and spiral, and successive circles of spots would show themselves upon the two surfaces.

During calms and when the water was quiet, they would, if not conscious of being observed, exhibit their many beauties, rowing along, their full sails tinged with elegant colours, resting the extremities of the sail-arms on the two sides of the shell or embracing the shell with them. Sometimes, when pressed by hunger, they would come almost to the surface of the water, and when Madame Power offered them food, they would snatch it out of her hands and greedily devour it.

Reproduction; Formation of the Shell by the young Argonaut; Repair of Fractured Shell.—Madame Power appears to have approached this part of the subject with the impression that she was only about to repeat the experiments of the great Poli on the eggs of the cephalopod, in which he supposed that he had discovered the embryo of the shell; but she obtained very different results. Madame Power repeated the experiments of Poli in the company of Dr. Anastasio Cocco of Messina and other persons, but nothing more was found than a group of eggs in each individual, similar to millet-seeds, perfectly white and transparent, attached by filaments of a brilliant gluten to a common stem of the same substance. Three days after the first observation, on visiting an Argonaut, little poulps were found in the shell of the parent, developed, but without shell, and resembling worms, having at the inferior extremity a spot of a brown colour, with some smaller spots disposed laterally. These, when examined by the microscope, were considered to be the viscera of the animal. After the three days the young poulps began to exhibit bud-like prominences, with two rows of obscure points, which were the rudiments of the arms and suckers. The other arms began to be distinguishable some days after the sailing-arms, and on the sixth day they had already formed the first *lamina* of the shell, which was exceedingly soft, yielding to the least pressure of the finger. The eggs are attached to the interior of the spire, and when excluded remain between the roof of the spire and the mantle of the mother. From these observations Madame Power concludes that the newly-born poulp *has no shell*. The observations of Poli therefore do not correspond with the experiments made by Madame Power; and the lady adds, with characteristic modesty, 'If I were not speaking of so celebrated a man, I should venture to say that the internal membrane of the egg was mistaken by him for the supposed rudiment of the shell.'

Madame Power, wishing to discover whether the little poulp could, without extraneous aid, begin to work the structure of its shell, or whether the parent assisted in the original formation, cautiously cut off the spire of divers Argonauts at the time of their fecundation. In the direction of its axis she found in one a little new-born poulp rolled up near the apex. Upon attentive observation she perceived that between it and the bottom of the spire of the parent shell there was a thin membrane, disposed in the same form as the curve of the spire, and fitted to the rolled-up little poulp, as if the gluten in which the whole infant mollusk was embedded, pressed between it and the end of the spire, became consolidated into a fine membrane in the same form as the spire, and embraced the young poulp.

In September, 1835, Madame Power enclosed in her cage some Argonauts at the time of their fecundation, taking care to examine them every fourth day carefully, for their irritability is such that they die if handled much. They were placed in a basin, and the observer was so posted that they could not see her.

On the 14th Madame Power found in one of the shells a little poulp fourteen lines long. Other shells were searched, and, in some, little poulps were found; in others none. On the 18th two parent poulps were dead. In the shell of that wherein she had first seen the little poulp she found that it had already passed into the spire. On the 24th, upon examination of this same shell, the little poulp was found already covered with its thin shell, which was 3½ lines in length. This little animal appeared to be completely formed, and its shell had the form of the spire in which it had been framed.

All the experiments made by Madame Power had the same results; her inference is, that the young Argonaut, when excluded from the egg, is naked; that it is progressively developed in the end of the spire of the parent; and that after a certain period it goes on forming the shell.

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* [illegible]

As far as Madame Power has observed, not more than two or three eggs develop themselves at the same time; and when the young have grown to the length of nine lines, they successively inclose themselves in the spiral of the parent, where the other arms are thrown out in the manner of buds. The young one takes three days to arrive at the length of nine lines, and four in the spiral to develop itself. The parent retains the young one three more days under her, and then ejects it from the shell.

An attempt was made by Madame Power to produce the development of the eggs as far as the production of the young poulp, without the aid of the mother, by suspending them in a fine linen bag in sea-water, which was changed thrice in the day. This attempt failed; the eggs swelled indeed, but it was the tumidity of putrefaction.

Madame Power concludes from this experiment that the glutinous material in which the young are enveloped in the spire of the parent conduces to their development; and this material being evidently a parental secretion, it may be said that without her aid the eggs could not be developed, and the young shell could not have its foundation laid in the end of the spire.

We shall now let Madame Power speak for herself. 'In spite of these successful experiments in favour of the shell being the property of the poulp of the Argonaut, I was anxious to be assured of the fact in a manner not hitherto attempted by others. "If the Argonaut," said I, "constructs its own shell, it ought to be able to repair fracture." Although Signor Ranzani had said that it was not to be believed that these poulps of the Argonaut should be so ill provided with means necessary for the preservation of their existence, that if the first habitation should be broken or lost, they cannot construct another; still I thought, from his mode of expression, that he had never himself made experiments in proof of this. Moreover I, who have made experiments on a hundred of these mollusks, have found that, when they have lost their shell, they are incapable of constructing another, and die;[*] but I broke in several places the shells of twenty-six individuals, and, to my great satisfaction, found, after thirteen days, the fractures healed in all the survivors, which were not more than three. The newly-secreted portion was stouter than the uninjured part of the shell, but not so white; it looked also a little rough and disturbed, neither did it present the usual risings, and, instead of ribs, it had some longitudinal furrows. Being desirous of observing in what manner the animal operated in repairing the broken shell, I took one the day after the first experiment, and found that the aperture was covered by a thin glutinous lamina, which, somewhat in the manner of a cobweb, unites the two margins of the broken shell. The next day the lamina was, to a certain degree, thickened and more opaque, till, at the expiration of ten or twelve days, the new piece had become quite calcareous. Whilst the Argonaut was in the act of mending the fractures in its shell, I am quite sure that it applied the sails to the shell and wrinkled them upon it, and by this movement I considered that the glutinous secretion which finally became calcareous was deposited.'

So far Madame Power has shewn that the Argonaut has the power of repairing fractures in the shell, like other *Testacea*, though not exactly by the same means; but she noticed another power, which she states that, as far as she knows, has not been observed in other testaceans. She found that whenever the animal which is going to repair its habitation can find pieces of other Argonaut shells, it takes, by means of its sail-arm, a fitting piece of broken shell and holds it in the fractured place, till it has secreted the material necessary for the firm attachment of the fragment, thus saving the expense and trouble of a secretion for supplying the whole area of the fractured aperture. 'After such a series of experiments,' says Madame Power, 'it seems to be sufficiently proved that the poulp of the Argonaut is the constructor of the shell in which it lives, and out of which it cannot exist long.'

Now though there may appear in the account of these experiments evidence of their having been drawn up by one not deeply versed in zoology, there is an air of truth and sincerity about them that makes them to us as valuable at least as any that could have been the result of the inquiries of a more learned observer. Madame Power indeed has, in our opinion, come to a somewhat hasty conclusion that these animals are hermaphrodites, because all those that were examined by her (more than a hundred) were furnished with eggs; but this inference is evidently not deemed conclusive by her, for she states her intention of making careful anatomical researches on this subject, which she had not enjoyed the opportunity of making when she wrote.

We have heard some stress laid on the mistake made by Madame Power, when she, at first, fancied that the parasitic *Hectocotylus* of Cuvier was the young of the Argonaut. We think but little of it; and indeed the very information that it was a parasite, which Professor Owen, who detected the genus, communicated to her, seems to have made her more vigilant. In a second paper, with the title of 'Nuove Osservazione sulle Uovo del Polpo dell' *Argonauta Argo*,' by the same lady, after alluding to this mistake, she makes the following observations on the progressive development of the young one. The egg was first white and transparent; no structure was discernible in it. After fifteen days it presented spots of a beautiful red. In ten days more the poulp could be discerned through the epidermis of the egg. Then the poulp began to break through that involucrum, and to the naked eye presented an elliptical form, with the eyes and mouth, and a very transparent membrane which forms the mantle. Towards the mouth some small and almost imperceptible filaments were observed, which Madame Power supposed to be the rudiments of the branchiæ. The poulps were now naked, but in twelve days from that time, on visiting them again, some were found which had already formed their shell, and the parent retained them and nourished them with her gelatinous secretion, as Madame Power had already stated in her memoir published in the 12th vol. of the 'Transactions of the Giœnian Academy.'

Captain Philip Parker King, R.N., during his well known voyage, met with some specimens of *Argonauta* in a rather curious way; and though he expresses his opinion with much modesty, it is plain what the inclination of that opinion was.

'On our passage from Santos to St. Catherine's, in lat. 28° south, we caught,' says Captain King, 'a dolphin (*Coryphæna*), the maw of which I found filled with shells of *Argonauta tuberculosa*,[*] and all containing the *Octopus Ocythöe* that has been always found as its inhabitant. Most of the specimens were crushed by the narrow passage into the stomach, but the smaller ones were quite perfect, and had been so recently swallowed that I was enabled to preserve several of various sizes containing the animal. To some of them was attached a nidus of eggs, which was deposited between the animal and the spire. The shells varied in size, from two-thirds of an inch to two and a half inches in length; each contained an octopus, the bulk and shape of which was so completely adapted to that of the shell, that it seemed as if the shell increased with the animal's growth. When so many learned naturalists have differed so materially as to the character of the inhabitants of the argonauta, it would be presumption in me to express an opinion; I therefore merely mention the fact, and state that in no specimen did there appear to be any connection between the animal and the shell.' (*Voyages of the Adventure and Beagle*, vol. i., p. 106.) We had an opportunity of examining the specimens above alluded to soon after Captain King's return, and they bore out in every particular the description given by him.

M. d'Orbigny (*Voyage dans l'Amérique Méridionale*) came to a conclusion in favour of the animal being the constructor of the shell, and consequently against the parasitic theory, from observations made by him on *Argonauta hians*.

In 1837, M. Rang, on his return from Algiers, where he had been observing these animals, had an interview with M. de Blainville, who had then the observations which Madame Power had just made in his hands; and, in April of that year, M. de Blainville read his elaborate Report, and afterwards published it, with additional dissertations, in the form of a memoir or letter, in the third number of the *Annales Françaises et Etrangères d'Anatomie et de Physiologie*. His arguments in favour of parasitism appear to be based on the following data:—1, That the same species of cephalopod is not always found in the same species of shell. 2, That the natural position of the animal in the shell varies, the back of the animal being sometimes next the outer wall, of the shell, sometimes near the involuted spire. 3. That the animal does not occupy the posterior part of the shell. 4. That the form of the animal and of its parts offers no resemblance or analogy with the shell. 5. That the shell is too opake to have permitted the influence of light in the development of the coloured pigment in the mantle of the cephalopod of the argonaut. 6. That it is very far from being true that the argonaut-shell possesses the flexibility and elasticity requisite to harmonise with the locomotive and respiratory movements of the animal. 7. That the animal suffers no appearance of inconvenience when deprived of its shell. 8. That a cephalopod has been discovered in the Indian seas like that which inhabits the argonaut, but without a shell. These data are designated by Professor Owen, to whose observations we shall presently advert, as false facts, with the exception of the third, which is only partially false, being true when stated with reference to the more mature animal only. The other arguments of M. de Blainville are noticed by Professor Owen as founded on undoubted or admissible facts; but the Professor denies the conclusions drawn by M. de Blainville.

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[*] Aristotle speaks of the shell as being like a hollow pecten (κτεις), and not naturally adherent to the polypus. He also states that it feeds very frequently near the land, so that it is thrown by the waves upon the sand, when the shell slipping from it, it is caught, and dies on land. (*Hist. Anim.*, iv. 1.)

[*] *A. rufa* of Owen.

M. Sander Rang in consequence of the appearance of M. de Blainville's memoir or letter, published in Guerin's *Magasin de Zoologie* a very interesting paper under the title of 'Documents pour servir à l'Histoire Naturelle des Céphalopodes Cryptodibranches.' In this memoir M. Rang's observations are confirmatory,—1, of Madame Power's statement that the siphon is applied to the part of the shell opposite the involuted spire; 2, of the accuracy of her description of the relative position of the so-called sails of the Argonaut with reference to the shell; 3, of her discovery of the faculty possessed by the animal of repairing the shell, and many other points.

No one will refuse to M. Rang the acknowledgment that he is not only a very accurate observer, but that he is well versed in the natural history and anatomy of the mollusca generally; so that here at least no doubt can be thrown on the observations.

M. Rang however appears to have been staggered by the pertinacity of M. de Blainville; for after all, he sums up by declaring himself to be 'in the most complete state of uncertainty.'

In February, 1839, a highly interesting and valuable series of specimens of the Paper Nautilus (*Argonauta Argo*) consisting of the animals and their shells of various sizes, of ova in various stages of development, and of fractured shells in different stages of reparation, were exhibited to the Zoological Society of London, and commented on by Professor Owen, to whom they had been transmitted for that purpose by Madame Power, who had formed the collection in Sicily, in 1838. In the course of his comments the Professor went at large into the subject, and in addition to the observations above alluded to with regard to the alleged false facts and admissible facts whereon M. de Blainville had founded his reasoning, combated at great length, and, in our opinion, with signal success, the arguments of those who adhered to what may be termed the parasite opinion; and recapitulated as follows the evidence which, independently of any preconceived theory or statement, could be deduced from the specimens then on the table.

1. The cephalopod of the argonaut constantly maintains the same relative position in its shell.

2. The young cephalopod manifests the same concordance between the form of its body and that of the shell, and the same perfect adaptation of the one to the other as the young of other testaceous mollusks.

3. The young cephalopod entirely fills the cavity of its shell; the fundus of the sac begins to be withdrawn from the apex of the shell only when the ovarium begins to enlarge under the sexual stimulus.

4. The shell of the Argonaut corresponds in size with that of its inhabitant, whatever be the differences of the latter in that respect. (The observations of Poli, of Prevost, of Rang, and of Owen, are to the same effect.)

5. The shell of the Argonaut possesses all the requisite flexibility and elasticity which the mechanism of respiration and locomotion in the inhabitant requires; it is also permeable to light.

6. The cephalopod inhabiting the Argonaut repairs the fractures of its shell with a material having the same chemical composition as the original shell, and differing in its external properties only in being a little more opake.

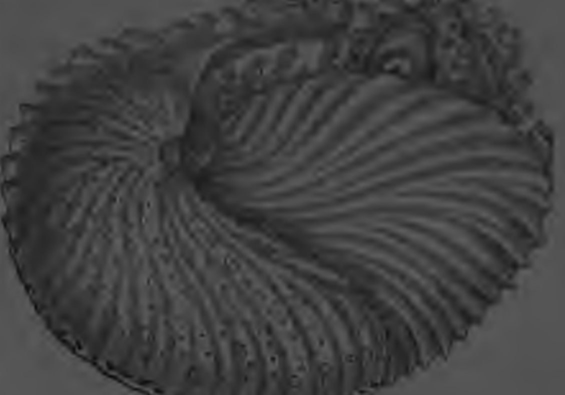
7. The repairing material is laid on from without the shell, as it should be according to the theory of the function of the membranous arms as solidifying organs.

8. When the embryo of the Argonaut has reached an advanced stage of development *in ovo*, neither the membranous arms nor shell are developed.

9. The shell of the Argonaut does not present any defined nucleus.

Professor Owen concluded a most elaborate commentary by stating that he regarded the facts already ascertained to be decisive in proof that the cephalopod was the true fabricator of the shell; and thus, in our opinion, is set at rest—principally by the experiments of Madame Power—a question which had divided the opinions of zoologists from the time of Aristotle, who left the subject with the following acknowledgment: 'But as touching the generation and growth of the shell, nothing is as yet exactly determined.'*

M. Rang's account of the locomotion of *Argonauta Argo* is most interesting. When the animal was at rest and contracted within its shell, it exhibited the appearance figured below.



Argonauta Argo contracted within its shell, and the membranes of the sail-arms partially covering it. The eggs were never seen by Mr. Rang in the place where they are represented, but much more within the opening. (Rang.)

'To return to the description of our poulp,' says M. Rang, 'which we left contracted within the argonaut-shell, and watching, with an attentive eye, what took place around it, we saw it extending itself from out its shell, and protruding six of its arms; then it threw itself into violent motion, and travelled over the basin in all directions, often dashing itself against the sides. In these different movements the body leant a little towards the anterior part of the shell; and the long slender arms, very much extended and collected into a close bundle, were carried before it, as well as the tube, which showed itself open and protruded. The locomotion was effected in the ordinary manner of poulps, the movement being backwards by means of the contraction of the sac and the expulsion of water through the siphon. The disposition of the animal and shell is the most favourable for accelerating the motion of the creature. The lightness of the shell,—its narrow and keeled form,—its width, which is smallest at the part presented first for cleaving the water—the membrane smoothing over all inequalities of the shell—the bundle of arms extending behind so as to offer the least possible resistance,—the two arms stretched like a bridge over the cavity where the eggs are, as if to throw off the water from that cavity;—all these adaptations concur to facilitate the gliding of the animal through the medium in which it is to move.'

M. Rang thought that he perceived in the movements of the animal, when in open water, that it had its back uppermost, and consequently the tube below; but he did not constantly see it so: he observed it however with more certainty in specimens of poulps whose arms had been deprived of their membranes.

The animal which they had been watching, as above described, fatigued by its efforts in a confined space, and perhaps injured by the shocks which it had sustained in coming in contact with the side of the basin, allowed itself to sink to the bottom, and half contracted itself in order to take repose; soon after which it exhibited another and unexpected

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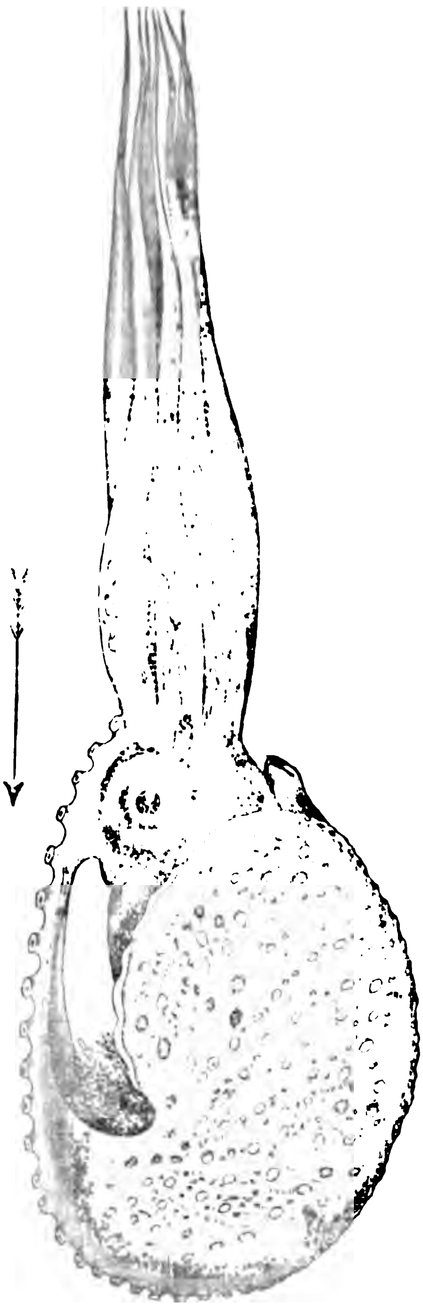
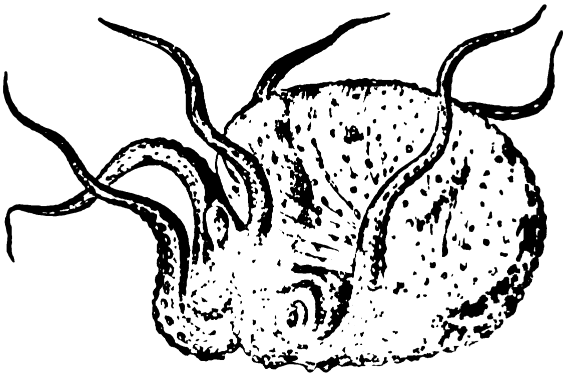
* Hist. Anim., iv. 7; where a detailed account of the locomotion of the Nautilus, its sailing, &c., is given.



Disposition of the shell and animal when moving through the water in the direction of the arrow. (Rang.)

spectacle. Fixing some of the acetabula of its fore-arms upon the bottom of the basin, it erected itself upon its head, spreading out its disc, and carrying the shell straight above it in the normal position of the shells of gastropods; then, beginning to crawl, it presented the appearance of a pectinibranchiate mollusk, as M. Rang had remarked in the note to the Academy of Sciences. Half drawn back into its shell, the animal appeared to crawl upon its disc, the palmatures of which were a little raised to follow the movements of its arms. The body was hidden in the shell; the siphon placed in the anterior part of it was turned forwards; the arms which were at liberty were very much protruded and twisting round, two before and two on each side: the base of the two large arms seemed to prolong backwards the locomotive surface, and then rising along the keel, they again covered it with their large membranes, as when the poulp was swimming in deep water. 'Thus,' continues M. Rang, 'this mollusk, at once pelagic and littoral, presents a most singular anomaly; when it swims at the surface of the water, having its ventral part lowermost, and when it crawls along the bottom having it, on the contrary, uppermost; things which are completely contrary to what we see among the pelagic mollusks on the one hand, and the littoral mollusks on the other.'



Argonauta Argo moving on its head at the bottom. (Rang.)

The progress of the animal, when moving as last above represented, was slow, and it worked itself onwards like the gasteropodous mollusks. M. Rang remarks that the reptation was only apparent; for the suckers really caused the motion.

When the poulp was at the point of death, it drew in by slow degrees its large arms and their membranes, and contracted them upon themselves and all the other arms, so as to obstruct the opening of the shell. At this moment the shell was moved, and the poulp separated itself from it, not voluntarily but accidentally, for it no longer held it in any way. It appeared at first to become a little reanimated, made some movements in the basin upon its head, then fell from weakness, and soon died. All this passed in less than ten minutes.

Translations of the memoirs of Madame Power and of M. Rang will be found in *The Magazine of Natural History*, vols. i. and ii., *N. S.*

In the Dibranchiate Octopods, generally, the ovary is a spherical sac with thick parietes. In the *Argonaut* the oviducts are two in number, long and convoluted, furnished with glandular coats throughout, but without partial enlargements: there are no separate nidamental glands. These oviducts are continued by a short common passage from the ovary and form several convolutions before they ascend to their termination, which is the same as in *Octopus*; but they differ from *Eledone* and *Octopus*, in having no glandular laminated bodies developed upon them: the minute ova of the Argonaut are consequently connected together by the secretion of the lining membrane of the long and tortuous oviducts. These ova occupy a greater or less proportion of the bottom of the shell; they are oval, about half a line in length before the development of the embryo has commenced, and are connected in clusters by long filaments. In the museum of the Royal College of Surgeons is a preparation (No. 2657 B., *Physiological Series*) of an Argonaut (*Argonauta rufa*, Owen) with the ventral parietes of the abdomen and the gills removed, to show the female organs of generation. The ovary is lodged at the fundus of the visceral sac. The two oviducts, which are contin from its posterior part, are convoluted at first, and then advance straight forwards to the base of the funnel. (vol. iv., Owen.)

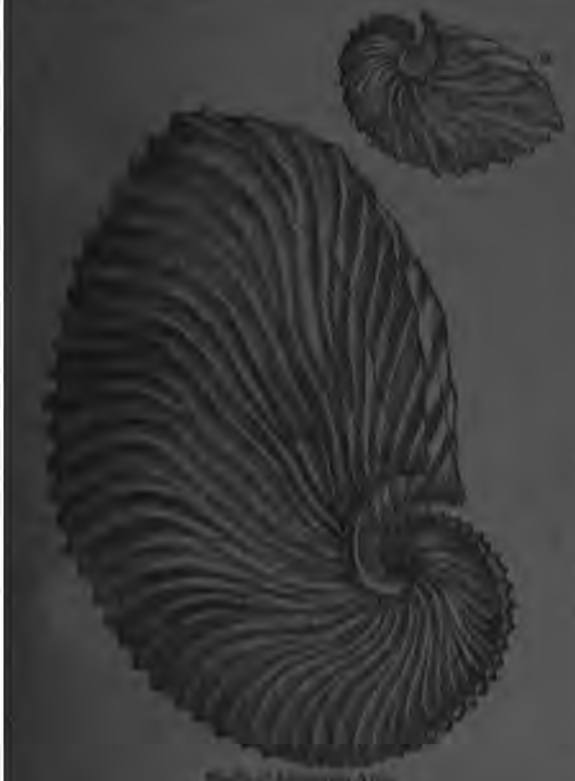
From the time of Aristotle the Cephalapods have been known to be diœcious with reference to the sexual organs, and there appears to be a great majority of females. We are not aware of a single instance of a male *Argonaut* having been taken: it remains to be proved whether this arises from the comparative activity of the males, their relatively small numbers, or from their not being furnished (which some have thought to be not an impossible case) with shell at all.

Place in the System.—The natural situation of *Argonauta* appears to be that assigned to it by Professor Ow namely in the Testaceous family of the tribe *Octop* Mr. Owen's second order of Cephalopods—*Dibranchia*

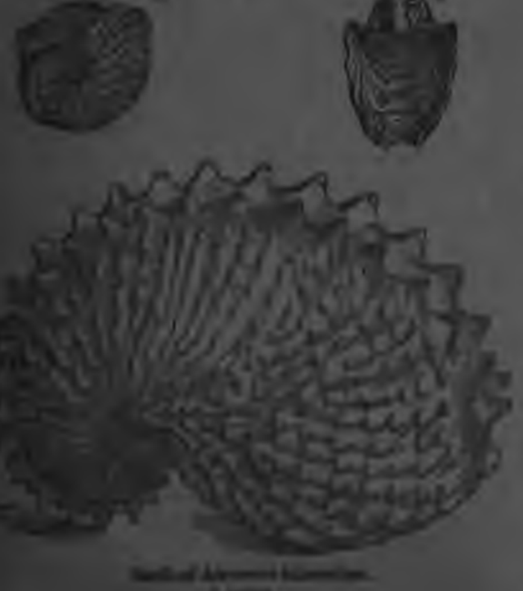
Generic Character.—*Body* oblong, rounded; mantle adhering posteriorly to the head; first or dorsal pair of arms dilated and membranous at the extremity. *Funnel* wit a valve, but articulated at its base by two ball-and socket joints to the inner sides of the mantle. *Branchial hearts* with fleshy appendages. No internal horny or testaceous rudiments; but an external, monothalamous, symmetrical shell, containing, but not attached to, the body of the animal, which also deposits its eggs in the cavity of the shell. (Owen.)

Geographical Distribution.—The seas of warm latitudes, both littoral and pelagic. Captain King's specimens above noticed (three of which by the way had no eggs in the shells) were taken from the stomach of a Dolphin caught upwards of six hundred leagues from land.

Several species are already known; and the specific characters rest in great measure upon the tuberculations and rib-like elevations on the outside of the shell and on the breadth of the keel. The absence or presence of projecting pointed processes at the sides of the aperture near the spire part cannot safely be relied on as a specific character: we possessed both broad-keeled and narrow-keeled specimens (now in the British Museum), in which the projecting process was present on one side of the shell and absent on the other.



Shell of Argonauta Argo.
[illegible]



Shell of Argonauta tuberculata.
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The fossil genus *Bellerophon* is placed by Professor Owen with *Argonauta* in the family of Testaceous Octopods. (BELLEROPHON.)

PAPER HANGINGS, a term applied (somewhat incorrectly) to the stained paper pasted against the walls of apartments, &c. The word 'hangings' was originally and properly applied to the woven or embroidered tapestry with which the walls of elegant rooms were covered. From the time necessary for their production, these were too costly for any classes but the wealthy. About 200 years ago however, a mode was devised of printing or painting a pattern on sheets of paper, and pasting them against the walls of a room; these are 'paper-hangings,' and they have greatly contributed to the comfort and cleanliness of domestic apartments.

There are three modes of producing the required device. 1. Wooden blocks are carved, representing in relief the *outlines* of the figure; an impression is taken from these blocks, and the device is completed by painting with a pencil. 2. A sheet of paper, leather, tin, or copper, is cut out into the required device, and laid on the paper to be stained; a brush, dipped in a coloured pigment, and worked over the surface of the perforated plate, conveys the pigment through all the perforations, and forms a pattern on the paper. 3. A block is carved for each of the colours to be employed, and an impression from all the blocks in succession fills up the design on the paper. The first of these modes is too slow and costly for ordinary use; the second produces imperfect outlines, and is now chiefly employed (under the name of *stencilling*) to paint a pattern on the plaster walls of a room, without using paper-hangings; the third, which is the mode almost exclusively employed at the present day, is described here.

The paper is printed in pieces twelve yards long, and to produce these it was formerly necessary to paste sixteen or eighteen sheets of paper together at the edges. But machine-made paper now allows the paper-stainer to procure the whole length in one piece. A 'piece' is laid out on a long bench, and the 'ground-colour' applied, consisting of pounded whiting tinted by the addition of some pigment, and liquefied by the aid of melted size; this is laid on with large brushes. When the paper is dry, it is ready to receive the print. Let us suppose the pattern to contain three colours,—red, dark green, and light green. Three blocks are carved in hard wood, the uncut parts (as in a common wood-block) representing the device; each block is intended for one colour only; and care is taken that all three shall combine their devices properly, when printed. The three pigments being mixed with melted size, in separate vessels, one of them (say red) is spread with a brush on a woollen frame covered with leather or flannel; the proper block is laid face downwards on the wet paint, takes up a layer of it, and imparts it to the paper, on which it is immediately pressed. Another similar impression is made adjoining the first; and so on, till the whole 'piece' has been printed with the red device. When dried, the paper goes through the same process a second time, with the substitution of a different colour and a different block from those before used. A third process with the other shade of green finishes the printing. Each block is furnished with small pins at the corners, by the aid of which the successive impressions are made to correspond properly. As many as seven or eight colours are sometimes employed in one pattern, and generally speaking there must be as many blocks as there are colours.

Some paper-hangings have a glossy or 'satin' ground. To produce this, a ground of satin white, properly tinted, is laid on; this ground is then rubbed with powdered French chalk worked by means of a brush, until a gloss is produced. After this the printing proceeds as usual. These 'satin' papers sometimes receive an additional beauty, by being passed between two slightly heated rollers, one of which has an engraved pattern in imitation of watered and figured silk, &c.: this pattern is thus imparted to the paper. *Flock* papers are those in which a portion of the pattern somewhat resembles woollen cloth. When the proper ground-colour has been applied, the device is printed, not with a coloured pigment, but with japan gold-size, and on this gold-size is sprinkled the flock, consisting of fragments of woollen cloth cut into a sort of down and dyed. The flock adheres to the gold size and can easily be brushed off the other parts. Sometimes flocks of two or three colours are employed; these are laid on at separate times. *Striped* papers are sometimes produced in a singular manner. The colour (rather more liquid than in other cases) is contained in a trough having parallel slits in the bottom. The paper is made to pass quickly under the bottom of the trough, by means of a revolving cylinder, and thus obtains a deposit of colour in parallel lines, through the slits in the bottom of the trough. By a modification of this method is produced what is termed a *blended* ground. A trough, containing many distinct cells, is filled with various tints of any given colour, one tint to each cell. A long narrow brush being dipped into all these cells, takes up a portion of each tint, which it applies to a roller; from the roller the pigment is transferred to a revolving brush, and from the brush to the paper. Thus is produced a blended or shaded ground, which afterwards receives any desired pattern.

Bronze or imitation gold-powder is frequently applied to papers. A device being printed in japan gold-size, the powder is lightly rubbed over the paper, and adheres to the gold-size. The remainder of the pattern is commonly printed in colours. In some papers, leaf-gold, silver, or copper is applied to a portion of the pattern: this is a slow and expensive process. Some papers, in order to bear washing or cleaning, are printed with colours mixed with oil or varnish instead of size.

The modes of cutting the pieces of paper and pasting them against a wall are too obvious to need mention here.

A recent change in the duty charged on all kinds of paper, is likely to have considerable effect in extending the use and improving the manufacture of paper-hangings. The duty on the paper itself has been reduced from 3*d.* to 1½*d.* per pound; while the additional duty of 1¾*d.* per square yard of paper-hangings, considered as such, has been wholly repealed. 'The reduction of price it has occasioned, has enabled a much larger class of persons to get their apartments papered; and it will in this way be productive not only of a great additional demand for paper, but of a great increase of comfort and cleanliness.' (M'Culloch.) Paper-hangings are indeed now made for so low a price as five-pence for the piece of twelve yards.

With regard to the *patterns* of paper-hangings, we may remark, that the attention which has lately been given to the promotion of the arts of design will probably lead to much improvement in the devices for paper-hangings, as well as for other ornamental productions. A few years ago Mr. Loudon suggested that 'an instructive *natural history paper* for cottages and the walls of nurseries and schoolrooms might be formed, by printing figures of all the commoner and more important plants and animals, with the scientific and popular names beneath them; each plant or animal being surrounded by lines, so as to appear either in frames or as if painted on the ends of stones and bricks.' An ingenious suggestion on the subject of 'intellectual paper-hangings' has recently been made in No. 504 of the 'Penny Magazine.'

PAPHLAGO'NIA (Παφλαγονία), a province of Asia Minor, also called Pylæmenia according to Pliny (vi. 2), was bounded on the north by the Euxine, on the south by the part of Phrygia afterwards called Galatia, on the east by Pontus, and on the west by Bithynia. It was separated from Bithynia by the Parthenius (Olu or Bartan), and from Pontus by the Halys (Kizil-ermak), which was also its eastern boundary in the time of Herodotus (i. 6, 72).

Paphlagonia is described by Xenophon (*Anab.*, v. 6, s. 6) as a country having very beautiful plains and very high mountains. It is traversed by two chains of mountains, running parallel to one another from west to east. The higher and more southerly of these chains, called Olgassys by Ptolemy, is a continuation of the great mountain-chain which extends from the Hellespont to Armenia, and was known to the antients under the names of Ida and Temnon in Mysia, and Olympus in the neighbourhood of Brusa. [ANATOLIA, p. 493.] Strabo (xii., p. 561, 562) however appears to give the name of Olgassys to the chain of mountains in the northern part of Paphlagonia, on which the Paphlagonians had built many temples. The country between these two chains of mountains is drained by the Amnias (Kara-su), which flows into the Halys. There were several small streams which flowed from the mountains in the north of Paphlagonia into the Euxine, but the only river of importance besides the Amnias and Halys was the Pathenius, which is said by Xenophon to be impassable. (Xen., *Anab.*, v. 6, s. 9.) In the neighbourhood of peiopolis, in the central part of the province, was a mountain called Sandaracurgium, where, according to Strabo (xii., p. 562), sandaraca was obtained in mines, which were worked by criminals, who died in great numbers in consequence of the unhealthiness of the labour. The sandaraca spoken of by Strabo was probably the same as sinopis, which was a kind of red ochre, obtained by the Greeks from Sinope, from which place it derived its name.

The Paphlagonians are said by Homer (*Il.*, ii. 851, 852) to have come to the assistance of the Trojans under the command of Pylæmenes from the country of the Heneti. This mention of the Heneti in connection with the Paphlagonians seems to have puzzled some of the antient writers. Several explanations of the passage were given; but the one which appeared most probable to Strabo (xii. 544) was that the Heneti were a Paphlagonian people, who followed Pylæmenes to Troy, and, after the death of their leader, emigrated to Thrace, and at length wandered to Italy, where they settled under the name of Veneti. Pliny (vi. 2) also connects the Heneti of Homer with the Veneti of Italy upon the authority of Cornelius Nepos; but few modern critics will be disposed to attach much credit to a rambling story of this kind, which seems to have arisen merely from the similarity of the two names.

The Paphlagonians were subdued by Crœsus. (Herod., i. 28.) They afterwards formed part of the Persian empire, and were governed by a satrap in the reign of Darius Hystaspis (Herod., vii. 72); but they appear in later times, like several other nations in the remote parts of the Persian empire, to have been only nominally subject to the king of Persia. On the return of the Ten Thousand, we find that they were governed by Corylas, who does not appear to have been a satrap (ἄρχων, Xenophon calls him, *Anab.*, vi. 1, s. 2), and who did not hesitate to afford assistance to the Greeks. After the death of Alexander, Paphlagonia, together with Cappadocia, fell to the share of Eumenes. (Diod. Sic., xviii. 3.) It subsequently formed part of the kingdom of Pontus; but after the conquest of Pontus by the Romans, it appears to have been allowed to have kings of its own, the last of whom was Deiotarus, the son of Castor. (Strabo, xii. 562.) Under the early Roman emperors it did not form a separate province, but was united to the province of Galatia till the time of Constantine, who first erected it into a separate province.

The principal town of Paphlagonia was Sinope (Sinoub), a colony of the Milesians (Xen., *Anab.*, vi. 1, s. 15), which was said to have been founded by Autolycus, a companion of Jason. It was built upon a peninsula, and was for many centuries one of the most flourishing commercial towns on the Euxine. In the time of Strabo, when its trade had greatly decreased, it was a place of considerable importance. It was very strongly fortified, and possessed many handsome public buildings. The soil in the neighbourhood was very fertile, and the inhabitants were accustomed to catch off the coast great numbers of pelamydes, a species of tunny-fish. Sinope maintained its independence till the second century before the Christian æra, when it was taken by Pharnaces I., king of Pontus, and annexed to the kingdom of Pontus. Mithridates the Great, who was born there, made it the capital of his dominions, and adorned it with many public buildings. During the war which he carried on with the Romans, it was taken by Lucullus. It was subsequently made a Roman colony. Diogenes the Cynic was born in this town. (Strabo, xii. 545, 546; Plin., vi. 2.)

West of Sinope on the coast were—Harmene, off which the Ten Thousand anchored for five days (Xen., *Anab.*, vi. 1, s. 15-17); Abonteichos, afterwards called Ionopolis (Ainabal), which is described by Strabo (xii. 545) as a small town, and was the birthplace of the impostor Alexander, of whom Lucian has given us an account; and Amastris (Amasera), formerly called Sesamus, under which name it occurs in Homer (*Il.*, ii. 853). Amastris was built upon a peninsula, on each side of which there was a harbour. It received the name of Amastris from Amastris, the wife of Dionysius, the tyrant of Heraclea, and the daughter of Oxyathras, who was brother of the Darius conquered by Alexander. She peopled the new town with the inhabitants of Sesamus, Cytorus, Cromnum, and Tium. (Strabo, xii. p. 544.) Amastris is mentioned by the younger Pliny (*Ep.* x. 99) as a beautiful town in his time.

The principal towns in the inland part of Paphlagonia were—Pompeiopolis, on the river Amnias, which was built by Pompey after his conquest of Mithridates; and Gangra, on the confines of Galatia, which was the residence of D tarus, the last king of the Paphlagonians. (Strabo, xii. 541.)

PAPHOS. [Cyprus.]

PA'PIAS, one of the early Christian writers in the Greek language, was bishop of Hierapolis in Asia at the beginning of the second century. According to Cave, he flourished in the year 110, according to others in 115 or 116. He wrote five books, entitled 'An Explanation of the Words (or Oracles) of the Lord,' which are now lost. In a passage of this work which is quoted by Eusebius, Papias professes to have taken great pains to gain information respecting Christianity from those who had known the apostles, and some remarkable statements of his respecting the apostles and evangelists are still preserved. According to Irenæus, he was himself a hearer of John and a companion of Polycarp. He is said by Eusebius to have been a Millennarian, and a man of little mind, 'as appears,' says Eusebius, 'from his own writings.' (Eusebius, *Hist. Eccl.*, iii. 39; Cave, *Hist. Lit.*, under 'Papias;' Lardner's *Credibility*, pt. ii., c. 9.)

PAPIER-MÂCHÉ, the French term for a preparation of macerated paper, of which many articles are manufactured in England, France, and Germany. Such articles have been made in France for more than a century, for in 1740 one Martin, a German varnisher, went to Paris to learn the manufacture from Lefevre. On returning to his own country, he was so successful in his exertions, that his paper snuff-boxes were called, after him, 'Martins.' So much money went from Prussia to France in purchase of papier-mâché articles, that Frederic II., in 1765, established a manufactory at Berlin, which soon became very successful. Brunswick, Nürnberg, Vienna, and other German towns by degrees commenced the manufacture, and it is now carried on to a considerable extent.

Two modes are adopted of making articles of this kind: 1, by glueing or pasting different thicknesses of paper together; 2, by mixing the substance of the paper into a pulp and pressing it into moulds. The first mode is adopted principally for those articles, such as trays, &c., in which a tolerably plain and flat surface is to be produced. Common millboard, such as forms the covers of books, may convey some idea of this sort of manufacture. Sheets of strong paper are glued together, and then so powerfully pressed that the different strata of paper become as one. Slight curvatures may be given to such pasteboard when damp by the use of presses and moulds. Some of the snuff-boxes are made by glueing pieces of paper, cut to the sizes of the top, bottom, and sides, one on another, round a frame or mould, which is afterwards removed. Articles made of pasteboard have often a fine black polish imparted to them in the following manner:—After being done over with a mixture of size and lampblack, they receive a coating of a peculiar varnish. Turpentine is boiled down till it becomes black, and three times as much amber in fine powder is sprinkled into it, with the addition of a little spirit or oil of turpentine. When the amber is melted, some sarcocolla and some more spirit of turpentine are added, and the whole well stirred. After being strained, this varnish is mixed with ivory black, and applied in a hot room on the papier-mâché articles, which are then placed in a heated oven. Two or three coatings of the black varnish will produce a durable and glossy surface impervious to water.

Papier-mâché, properly so called, however, is that which is pressed into moulds in the state of a pulp. This pulp is generally made of cuttings of coarse paper boiled in water, and beaten in a mortar till they assume the consistence of a paste, which is boiled in a solution of gum-arabic or of size to give it tenacity. The moulds are carved in the usual way and the pulp poured into them, a counter-mould being employed to make the cast nothing more than a crust or shell, as in plaster-casts. In some manufactories, instead of using cuttings of made paper, the pulp employed by the paper-maker is, after some further treatment, poured into the moulds to produce papier-mâché ornaments.

The use of ornaments made in the way just described is greatly increasing. The carved and composition ornaments employed in decorating picture and glass frames are in some cases superseded by those of papier-mâché; but it is in the decoration of ceilings and walls of rooms and the interiors of public buildings that papier-mâché is found most valuable. Plaster and composition ornaments are very ponderous; carved ornaments are costly; but those of paper are light and of moderate price. In many of our theatres, in the House of Lords, in the Pantheon Bazaar, in some of the splendid steam-boats recently built, and in numerous other instances, where internal decorations are required, papier-mâché ornaments have been largely employed. Maps in relief are also occasionally made of papier-mâché.

The most remarkable instance of which we have heard of the employment of papier-mâché is one of which mention is made in a recent volume of Ersch and Gruber's 'Allgemeine Encyclopädie.' Near Bergen in Norway a church has been built capable of holding nearly a thousand persons. The building is octagonal without, but perfectly circular within. The interior of the walls as well as the exterior of the Corinthian columns, is covered with papier-mâché. The roof, the ceiling, the statues within the church, and the basso-rilievos on the outside of the walls, are also made of this substance. The papier-mâché was made waterproof and nearly fire-proof by an application of vitriol water and lime slaked with whey and white of egg. We may here remark, that paper roofs have been occasionally used in England. Sheets of stout paper are dipped in a mixture of tar and pitch, dried, nailed on in the manner of slates, and then tarred again; this roof is waterproof, but it is unfortunately very combustible.

PAPILIONA'CEÆ, a fanciful name given to the principal division of Leguminous plants, from an imaginary resemblance between their flowers and a Papilio, or butterfly. This appearance is owing to the excessive irregularity of the petals of such plants, one petal being large and expanded flat, and the other four arranged in a peculiar manner, and much smaller. The garden pea offers a familiar example of this structure. In technical language, the back or largest petal is the *vexillum*, or *standard*, the two external of the lateral petals *alæ*, or *wings*, and the two interior, which adhere by one edge, the *carina*, or *keel*.

PAPINIA'NUS, ÆMI'LIUS, was a pupil of the jurist Q. Cervidius Scævola at the same time with Septimius Severus, afterwards emperor. Under the emperor Marcus Aurelius he held the office of advocatus fisci, in which he succeeded S. Severus. After Severus became emperor, Papinian was his libellorum magister, and præfectus prætorio. Paulus informs us that he had given an opinion before Papinian in his auditorium. (*Dig.*, 20, tit. 5, s. 12; *Dig.*, 12, tit. 1, s. 40.)

Severus was always on intimate terms with Papinian, and at his death recommended to him his two sons Caracalla and Geta. Caracalla murdered his brother, and shortly after put to death Papinian, together with Papinian's son, who was quæstor. The cause of this execution is only obscurely stated (Spart., *Sever.*, c. 21; *Anton. Carac.*, c. 8); but it appears that the rigid morality of Papinian was shocked by the brutal conduct of Caracalla, and that he showed his disapprobation of his unnatural act.

Few Roman jurists were held in higher estimation than Papinian, and he is often cited in the most honourable manner both by the historians (Spart., *Sever.*, c. 21) and in various parts of the code (*Cod.*, 5, tit. 71, s. 14, &c.). Justinian (*Const. ad Antecess.*) in the course of study which he laid down after the completion of the 'Institutes,' 'Digest,' and 'Code,' in speaking of the third year's course of study, makes special mention of Papinian. The twentieth, twenty-first, and twenty-second books of the 'Digest' were enjoined to be read in place 'acutissimi Papiniani;' the name *Papinianistæ* was still to be retained by the students of the third year, and the festival formerly celebrated on the occasion of commencing his work, it was declared, should be solemnly kept as usual, in order that the memory of the great Papinian might be for ever preserved. The 'Digest' contains extracts from his thirty-seven books of 'Quæstiones,' his nineteen books of 'Responsa,' and fragments from his two books of 'Definitiones,' his two books on 'Adulteria,' and a single book on 'Adulteria;' also from a Greek fragment, entitled *ἐκ τοῦ ἀστυνομικοῦ μονοβίβλου Παπινιανοῦ*, that is, 'On the duty of the Ædiles in Rome and the Municipia.' Papinian is chiefly quoted by Paulus and Ulpian, and sometimes also by Marcian. The proportion which the extracts from Papinian bear to the whole 'Digest' is stated under JUSTINIAN'S LEGISLATION.

PAPI'RII, the name of a patrician and plebeian gens in antient Rome, who were formerly called Papisii.* (Cic., *Ad Fam.*, ix. 21.) This gens was divided into several families, such as the Mugillani, Crassi, Cursores, and Massones; and the most celebrated of the different individuals of these families was **Lucius Papirius Cursor**, who was the grandson of L. Papirius Cursor, who was censor in the year in which Rome was taken by the Gauls (Liv., ix. 34), and son of Spurius Papirius Cursor, who was military tribune in B.C. 379 (Liv., vi. 27).

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* According to Pomponius, the letter r was invented by Appius Claudius; so that instead of Valesii and Fusii, the Romans afterwards said Valerii and Furii. (Dig. 1, tit. 2, s. 2, § 36.)

We first read of L. Papirius Cursor as master of the horse to L. Papirius Crassus, who was created dictator B.C. 339, by the consul Manlius, in order to carry on the war against the Antiates. (Liv., viii. 12; Cic., *Ad Fam.*, ix. 21.) The time of his first consulship is doubtful. Livy mentions C. Pœtilius and L. Papirius Mugillanus as consuls in B.C. 325; but he adds that instead of Papirius Mugillanus, the name of Papirius Cursor was found in some annals. (Liv., viii. 23.) During the year of their consulship the Lex Pœtilia Papiria was passed, which enacted that no one should be kept in fetters or bonds, except for a crime which deserved them, and only until he had suffered the punishment which the law provided; it also enacted that creditors should have a right to attach the goods, and not the persons, of their debtors. (Liv., viii. 28.)

In the following year Papirius Cursor, who is said by Livy (viii. 29) to have been considered at that time the most illustrious general of his age, was appointed dictator to carry on the war against the Samnites. He appointed Q. Fabius Maximus his master of the horse; and during his absence at Rome to renew the auspices, Fabius attacked the enemy contrary to his commands and gained a signal victory. On his return to the camp, he commanded Fabius to be put to death; but the soldiers espousing the cause of the latter, the execution was delayed till the following day, before which time Fabius had an opportunity of escaping to Rome, where he placed himself under the protection of the senate. The proceedings which followed are interesting to the student of the constitutional history of Rome, as they show that an appeal (*provocatio*) could be made to the people from the decision of a dictator, which is in accordance with a remark of Livy in another part of his history (iii. 55), that after the decemvirs were expelled from Rome, a law was passed, enacting that in future no magistrate should be made from whom there should be no appeal. Papirius demanded Fabius of the senate; and as neither the entreaties of the senators nor those of the father of Fabius, who had been dictator and three times consul, could induce Papirius to pardon him, the father of Fabius appealed (*provocavit*) to the people, and at length, at the earnest entreaties of the people and of the tribunes of the plebs, the life of Fabius was spared. Papirius named a new master of the horse, and, on his return to the army, defeated the Samnites, and put an end to the war for the time. (Liv., viii. 29-37.)

Papirius was elected consul a second time with Q. Publius Philo, in B.C. 320, and again defeated the Samnites; and apparently a third time in the following year, though there appears to be some doubt upon the latter point. (Liv., ix. 7-16.) He was consul for the fourth time in B.C. 315 (Liv., ix. 22), and for the fifth time in B.C. 313 (Liv., ix. 28). He was again named dictator in B.C. 309, to carry on the war against his old enemies the Samnites, whom he defeated with great slaughter, and obtained, on account of his victory, the honour of a triumph (Liv., ix. 38, 40); after which time we find no further mention of him.

Papirius Cursor, says Livy (ix. 16), was considered the most illustrious man of his age; and it was thought he would have been equal to contend with Alexander the Great, if the latter, after the conquest of Asia, had turned his arms against Europe.

PAPIST, an appellation derived from *papa*, 'the pope,' and which denotes a follower of the Roman church. That church calls itself catholic, which means 'universal;' but as other Christian churches also style themselves 'catholic,' a distinction seems required to avoid confusion. The appellation Roman Catholic is generally used all over Europe to denote a follower of the church of Rome, in contradistinction to the followers of other Christian communions; but in Great Britain the words Papist and Romanist have been long in common use; the former especially being employed in vulgar language, with a certain degree of prejudice and obloquy attached to it. The origin of the word 'papa' is given under Pope.

PAPPUS, ALEXANDRI'NUS, an eminent mathema- an of Alexandria, who flourished about the end of the h century of our æra. In the very brief accounts we have of him, he is mentioned as the author of sever treatises, all of which, except his 'Mathematical Collect (Μαθηματικαὶ Συναγωγαί), probably the most valuable of writings, appear to have perished. This work, as its imports, is miscellaneous; and besides a variety of pr sitions, both problems and theorems, contains some cur notices, not found elsewhere, of the history of mathemat and of mathematicians in his own and in preceding times. the eight books of the 'Mathematical Collections,' the f and about one half of the second are presumed to be l the rest have reached the present time, though with m imperfections, and in some passages so mutilated that meaning cannot be certainly determined. The orig Greek, except some short extracts, has never been print and the only translation of it, which is by Command was first published at Pesaro in 1588; and another edit with little variation or improvement, was printed in 1 at Bologna. This translation is accompanied with a mentary, often tedious, and in some places defective; at the same time it is extremely valuable, from the ex nation which it contains of some difficulties, and the rection of many errors in the manuscript used by Com dine, and which pervade all the manuscripts of Papp have hitherto been examined. From Commandine's ma of referring to the Greek, it appears that he had on manuscript for his guide. He died before the work received his last corrections, and no account is given of history or character of the manuscript which he fol From a family dispute between two sons-in-law, the p cation was suspended for some time after his death; length, by the munificence of his patron, the duke of Ur the translation was printed, but confessedly without a rection whatever of the errors or omissions in the unfin work of Commandine. In this state however it was a ve interesting communication to the mathematicians of age, and almost immediately excited the greatest inte and attention towards the Greek geometry.

The two first books of Pappus are not in Command translation, from their not being found in any of the M to which he had access; but a portion of the second was afterwards found in a MS. in the Savilian Librar Oxford, and published by Dr. Wallis in 1658, with a L translation, and valuable notes explanatory of the G arithmetic. From this remaining fragment, it is rea conjectured by Dr. Wallis that these two books solely to that arithmetic; and thence he infers that loss of them is not greatly to be lamented: the whole of the second book appears to be equivalent to what is considered as a very simple proposition, viz. that the mu plication of any numbers, all or any of which have cyph annexed, may be performed by multiplying these num without the cyphers, and then adding all the cyphers to product. The first book was probably employed about simple operations of the addition and subtraction of n bers. The third book contains geometrical problems linear and solid. The fourth contains theorems of pl solid, and linear classes of propositions. The fifth tr principally of isoperimetrical figures. The sixth is ployed chiefly in explaining and correcting some prop of Theodosius and some other antient writers, in trea on spherics. The seventh book is entirely on the an analysis. The eighth and last book is entirely on chanics; but though a curious document of the state of branch of science in the time of Pappus, yet, from great improvement both in the theory and prac mechanics in modern times, it is comparatively of value.

(Dr. Trail's *Life of Simson*; Suidas, in voc. 'V Chronologiâ Mathematicorum;' and *Montucla*, tom.

PAPPUS is a peculiar form assumed by the certain flowers chiefly of the natural order C Owing apparently to the want of sufficient space in which to grow larger, the calyx of such plants remains in a rudimentary condition, sometimes b mere rim, but more frequently expanded into scaly hairs, or similar processes, which are in most instances lourless. The *down* of the Dandelion is a familiar ins of pappus in a state of beautiful division resembl feathers.

PAPUA, commonly called New Guinea, is an isl great extent, situated at the junction of the Indian Pacific Oceans. It is separated by Torres Strait the northern extremity of Australia; by the St

Galewo from the small island of Salawatty, which lies farther west; and by Dampier's Strait from New Britain, which is to the east of it. It extends from 10° S. lat. nearly to the equator. The most southern point, Cape Rodney, is in 10° 5' S. lat., and the most northern point, Cape Good Hope, in 0° 19' S. lat. From west to east it extends between 130° and 151° 30' E. long.; the most western point, Cape Pula, on Galewo Strait, is in 130° 2' E. long., and the most western Cape Rodney, in 149° 30' E. long. Its length, from east-south-east to west-north-west, is nearly 1300 miles. Its width varies between 300 and 18 miles. The main body of the island, east of 135° E. long., constitutes a vast extent of continuous land, with a projecting peninsula at its eastern extremity, but between 133° and 135° E. long. a wide and open bay enters deeply into the land. This bay, called Geelvink, or Great Bay, is nearly 200 miles wide at its entrance, in which some islands of considerable extent are situated, and penetrates about 200 miles southward into the body of the island. The southern extremity of this bay is separated from the Molucca Sea by an isthmus only about 19 miles wide. That part of the island which is west of this isthmus greatly resembles in form the islands of Celebes and Gilolo, consisting of a projecting peninsula and deep inlets. The largest of the inlets is MacCluer's Bay, which is upward of 100 miles long. According to a rough estimate, the surface of the island is 270,000 square miles, or about 55,000 square miles more than the area of France.

The surface and soil of this island are only known so far as they have been seen by navigators who have sailed along the coast. There are few places on which Europeans have landed, and in no place have they penetrated more than a few miles inland. The south-eastern peninsula, which terminates with Cape Rodney, is formed by a continuous chain of high hills; and, as far as we know, a high and mountainous country extends along the northern shores of the island; the ascent of the mountains however is in general gradual, and though in several places they attain a considerable elevation, as Mount Arfak, south of Dory Harbour, none of them appear to rise to the snow-line. The declivities of the mountains are generally covered with wood, but these forests are free from underwood, which is rather a rare occurrence between the tropics. Small rivers are numerous, and there are probably some larger streams in the wider part of the island. In some places the surface is covered with good grass. Along the northern coast the sea is deep enough to be navigated by the largest vessels, and there are a few good harbours. At a distance of from 10 to 20 miles from this coast there are numerous islands, which seem to lie in a row, and among which several are of volcanic origin. Dampier noticed three active volcanoes.

Along the southern shores, the country west of the isthmus is likewise mountainous, and the coast rather high and rocky, but it does not rise to any considerable elevation on the shores of MacCluer's Bay. The isthmus itself is formed by a chain of high hills. East of the isthmus, as far as Cape Buro (135° E. long. and 4° S. lat.), the mountains advance close to the shore, and the sea can be navigated by large vessels. Cape Buro rises to a great height close to the sea; but east of this promontory the mountains recede farther inland. They are visible from the sea as far east as 138° E. long., but appear to be a great distance from the shore, which shows that they must attain a considerable elevation. Some navigators think that they have observed snow on them. No mountains appear east of 138°. The country between the sea and the mountains, and the whole country east of 138°, as far as it has been seen, is very low, and covered with extensive swamps, but generally occupied by lofty trees. This low coast cannot be approached, as it is lined by a broad belt of mud-banks. At a distance of from six to ten miles the depth of the sea does not exceed four or five fathoms, and it gradually decreases towards the land. Boats which try to effect a landing stick fast in the mud at the distance of one or two miles from the beach. South of 8° S. lat. a wide and low promontory projects into the sea, between 138° 20' and 139° E. long. It is called Valsche Caap (Cape False), and up to 1835 was considered a part of Papua, but in that year a Dutch vessel discovered a strait between it and the mainland of Papua. This strait is called *Princess Marianne Strait*, and the island, which is divided by it from Papua, has received the name of *Frederik Hendrik's Island*. This island is low and swampy, but covered with trees. Along the low shores are the mouths of some considerable rivers. Four of them occur between 136° and 137°, and are named, from west to east, Wamoka, Dianara, Valsche Wakka, and Valsche Dianara. These rivers are not accessible to vessels, on account of the extensive mud-banks at their mouths.

We are not acquainted with the climate of this country, except so far as it may be inferred from its geographical position and the nature of the surface.

The natural productions of these islands are little known. The only animals are dogs, wild cats, and hogs, which are rather plentiful. Fish and turtle abound, and the inhabitants of the coast subsist chiefly on them. Agriculture is limited to the planting of two kinds of bread-fruit trees and cocoa-nut palms. But the inhabitants of the interior, the Haraforas, are said to practise gardening and some sort of agriculture. It does not appear that the sago-palm grows on this island, as the Papuas fetch it from the island of Waygiou. Nor are the cocoa-nut palms numerous. Lemons, limes, bamboo, and rattans seem to grow spontaneously. It is supposed that gold is found in the interior.

Inhabitants.—Papua is inhabited by two or perhaps three nations. Along the coast of the western half of the island are the Papuas, who have received that name from the Malays, in which language the word signifies 'frizzled hair.' They are considered to belong to the same race as the inhabitants of Australia, but there appears to be some difference between them in the structure of their body, though they agree in their woolly hair, and also nearly in colour. The Papuas are rather stout, and not so slender and short as the Australians. Their eyes are small and dark; the nose somewhat curved and projecting downwards; the lips thick, the mouth large, and the teeth exceedingly white. Though stouter than the Australians, they are not so stout as the African negroes. Though placed near the line, they do not go entirely naked. The men wear a thin stuff, made of the fibres of the cocoa-nut tree tied round their middle and between their legs; the women are dressed in the same manner, but they wear blue Surat cloth. Their residences exhibit a greater degree of civilization. Forrest found in the harbour of Dory, on the northern coast, two large houses built on posts fixed several yards below low-water mark; and a long stage, likewise fixed on posts, went from it to the land just above high-water mark, while another of the same kind stretched out seaward. This tenement contained many families, who lived in cabins on each side of a wide common hall that went through the middle of it, and had two doors, each opening to one of the stages. The married people, unmarried women, and children lived in this tenement and the adjacent cabins, but the bachelors inhabited a separate house, at some distance from the stage, lying seaward, in deeper water, and resting on stronger posts. Besides fishing, they carry on some trade with the Chinese, who visit the northern coasts, and exchange some of the goods obtained in this way for provisions with the Haraforas. The Papuas seem to constitute a great number of small political societies, and to speak a variety of dialects, or perhaps languages.

The Haraforas inhabit the interior of the western half of the island, but in the eastern district they seem to be in possession of the shores, especially along the southern coast, where the country is low. They live in huts, built between the branches of high trees, to which access can only be had by a ladder, which is drawn up during the night. They are said to be distinguished from the Papuas by a lighter colour, straight hair, and greater strength and activity of body. They are cannibals, and no person is permitted to marry until he can show the skull of a man whom he has killed. In this they resemble some tribes of Borneo and the Battas of Sumatra. They seem to have made some progress in agriculture, and they raise provisions, among which are plantains and kalavansas, which they sell to the Papuas. It is, according to our ideas, difficult to comprehend in what relation they are placed to the Papuas. Forrest states that a Harafora, by receiving an axe or chopping-knife from a Papua, makes his land or his labour subject to a perpetual tax of something, according to agreement. If the Harafora loses the instrument, he is still subject to the tax; but if he breaks it or wears it to the back, the Papua is obliged to give him a new one, or the tax ceases.

Commerce.—No European nation has at present any commercial intercourse with Papua, nor, as far as we know has this island been visited by European vessels for that purpose. The Chinese and the inhabitants of the Ceram Lant and Goram Islands appear to carry on a very lucrative trade, the former on the northern and the latter on the southern coast. The Dutch, who have several settlements on the Molucca Islands, and consider Papua as one of their possessions, do not permit their countrymen to trade to Papua, for fear of the introduction of fire-arms and ammunition, in spite of the regulations made to prevent it; but they give permission to the Chinese to trade on the northern coast. The Chinese import into Papua iron tools, especially chopping-knives and axes, blue and red cloths, China-beads, plates, basins of China and other similar articles, and take in return, slaves, ambergris, trepang, tortoise-shell, small pearls, black loories, large red loories, birds of Paradise, and many kinds of birds which the Papuas have a peculiar way of drying. But the principal article of export is a bark called masoy bark, which is taken to Japan, where the powder made of it is extensively used for rubbing the body. In Japan a pecul of this bark fetches thirty dollars. The harbour of Dory, near the western side of the Bay of Geelvink, is the most frequented by the Chinese.

The Ceram Lant and the Goram Islands are two small groups lying south-east of the eastern extremity of Ceram. The inhabitants of these islands are very active and good seamen. They traverse the Molucca and Java seas, and go as far as Sumbawa and Bali; but their most lucrative commerce is with Papua. It is supposed that the decided animosity with which the Papuas commonly receive Europeans is chiefly to be ascribed to the notions instilled into them by these traders, who also use every artifice to impress on their mind a similar hatred against the Bugis from Celebes and against the Chinese, fearing these two nations as rivals in their commercial transactions. This commerce seems to be very extensive, as it is stated that one village or town on the island of Goram, called Enekka, sends twenty-five junks to Papua. They principally visit the Bay of Lokayic, Onie, and Karrats-Quey: the locality of the two last-mentioned places is unknown. The exports consist of masoy-bark, nutmegs, pearls, trepang, edible bird-nests, birds of Paradise, and several other valuable articles. Kolff, who gives this list, does not mention the articles of import, of which however cotton-cloth and iron seem to be the most important; but he adds that one can hardly imagine what quantities of these articles are annually exported by these islanders, and afterwards sent to Bali or Singapore, or sold to the Chinese settled on the Moluccas. It seems that his report of this extensive traffic has been the principal inducement to the Dutch government for founding a colony on this coast.

History.—The Portuguese discovered the western part of Papua soon after they had settled in the Moluccas, between 1512 and 1530. The Spaniard Saavedra visited it in 1528. Several other navigators discovered other parts of the coast. Our countryman Dampier discovered the strait which divides the island from New Britain, and sailed along the whole extent of its northern coast. In 1792 MacCluer surveyed the bay which bears his name; and in 1802 Flinders examined the country adjacent to Torres Strait, which was discovered by the Spaniard Torres in 1606. In modern times Kolff, a Dutchman, has discovered and surveyed the south-western coast; and, as already observed, on his report respecting the advantageous trade which may be carried on with this island, the Dutch government founded a colony, and erected, in 1828, a small fortress on a spacious bay, called by the natives Ooroo-Langooroo, and by the Dutch, Tritons Bay. The fortress, which is called Dubus, is situated in 3° 42′ S. lat. and 134° 15′ E. long.

(Forrest's *Voyage to New Guinea and the Moluccas*; Leyden, in *Asiatic Researches*, vol. x.; Delano's *Voyages and Travels*; Kolff's *Reize door den Weinig Bekenden Zuidelijken Molukschen Archipel en langs de Geheel Onbekende Zuidwest Kust van Nieuw Guinea;* and Modera's *Verbadl van eene Reize nar en langs de Zuidelijken West Kust van Nieuw Guinea gedaun in* 1828.)

PAPY'RUS, in botany, is a Cyperaceous aquatic plant, whose soft cellular flower-stem afforded the most antient material from which paper was prepared. It has a stem from three to six feet high, with three acute angles, one of which, according to Bruce, is always opposed to the current of the stream in which it grows, as if to break its force. Its leaves are long and grassy, with a sharp keel. The flowers, which are green, are produced in very large compound umbels, with extremely numerous drooping triangular slender radii, terminated by very long filiform involucral leaves, within which are placed the spikes of flowers, each consisting of from six to thirteen florets. It is usually regarded as a species of *Cyperus*, and is called *C. Papyrus*; by most botanists it is considered a distinct genus, and is named *Papyrus antiquorum*. It is a very common plant in Abyssinia, Egypt, and Syria, and is also met with in Calabria and Sicily; in gardens it is not uncommon. It inhabits both stagnant waters and running streams, and, independently of its antient employment in the fabrication of paper, has been applied to other uses. The flowering stems and leaves were twisted into ropes; the roots are sweet, and have been employed as food. In Abyssinia boats are constructed from it, according to Bruce. In Syria the plant is called *Babeer*.

PAPY'RUS is not only the name of the plant, but also of the material which used to be derived from it for writing upon; and the written scrolls made of that material which have been found in various countries are called papyri. The antients employed for this purpose the thin concentric coats or pellicles that surround the triangular stock of the plant, those nearest the centre being the best and finest; they cut them into strips of a certain length, and placed them side by side in a layer on a board, another layer of the same material being pasted over it crosswise, so as to form a sheet of convenient thickness, which, after being pressed and dried in the sun, was polished with a shell or other hard and smooth substance. A number of these sheets, about twenty in general, were glued together to form a scapus, or roll. The breadth of the roll was determined by the length of the slips taken from the plant, the broadest being about thirteen fingers' breadth, and others ten; the length of the scapus or roll might be carried to almost any extent: some have been found as long as thirty feet. The writing, as in all antient rolls of whatever material, is in columns, extended in the direction of the length of the roll, with a blank strip between them. In the Egyptian papyri, the lines run in the direction of the length of the papyrus for six or eight inches, and when the scribe came to the bottom of the papyrus, he began a new page to the left of the first, leaving between the first and second page a small blank strip, which of course would lie in the direction of the breadth of the papyrus. In some cases the pages are divided by perpendicular lines evidently drawn with a rule. We know from Herodotus that the Egyptians wrote from right to left like the Hebrews and Arabs, and this fact is readily proved by the inspection of a papyrus. The commencement sometimes contains a drawing or certain characters larger than the rest, corresponding to capital letters in our writing; these characters always stand at the right extremity of the line. The form of the strokes of many of the characters shows clearly that in making them the hand passed from right to left. The last line of a page, when it is not a complete line, terminates in such a way as to show that it commenced at the right side. Where a phrase or period is not completed at the bottom of the page, the continuation of it is found at the top of the next page or column to the left; and it is certain that in such cases this is the continuation of the incomplete phrase or period, because the two parts (that at the bottom of one page, and that at the top of the next) occur in other parts of the papyus in one continuous series. The same characters are often recognised at the commencement of the different pages, and these initials are very often written in red ink. Sometimes the first lines of the pages are exactly the same. ('The British Museum: Egyptian Antiquities,' vol, ii., ch. 7, in the *Library of Entertaining Knowledge.*) A framed papyrus (No. 16) in the Egyptian room of the British Museum is a good specimen of the style of writing.

Besides the papyri written in the enchorial or common language, there are others marked with hieroglyphic or pictorial characters, and these are generally divided by red lines into narrow columns of one inch or less in breadth, in which the symbols are placed one under another, and the columns are arranged from right to left, as in the enchorial writing.

Many papyri written in Greek have also been found in Egypt, some of which are interesting as being the oldest written records of any language that is understood in our times. The Greek papyrus of Mr. Grey, now in the British Museum, is probably of B.C. 135, and contains the translation of a deed of sale, the text of which, in enchorial characters, is on a papyrus at Paris; and another copy, likewise in enchorial characters, was brought to Berlin from Egypt, by General von Minutoli. The identity of the three is proved by their having the same registry on them in Greek. An English translation of the Greek papyrus is given in the above-quoted chapter of the 'Egyptian Antiquities,' with the text in the appendix, and likewise a translation of a Greek papyrus from Thebes, containing another deed of sale, dated in the reign of Cleopatra and Ptolemy her son, about 106 B.C.

The Egyptian museum at Leyden contains one hundred and forty-seven papyri, some in Greek, others in enchorial, some in hieroglyphic characters, and some bilingual.

There is among the Vatican papyri a specimen written in the enchorial or common characters, on which Champollion reads a date, expressing the twelfth year of Psammetichus, B.C. 640. Several papyrus rolls of the age of Darius, the son of Hystaspes, are said to be in the collections of Paris and Turin.

We have the testimony of Herodotus (v. 58), that Egyptian papyrus was an article of commerce, and a material for writing long before his time. He calls it byblos, from the Egyptian name of the papyrus plant, from which perhaps the Greek name 'biblion,' for book, has been derived. There was a town in the Delta called Byblus. 'The byblos,' says Herodotus, 'annually springs up; after it is plucked from the marshes, the top is cut off and converted to a different use from the other parts. The bottom part that is left, to the length of about one foot and a half, they sell as an eatable commodity.' And in other passages he notices incidentally the uses to which the top part was turned. 'The priests wear shoes made of the byblos; the sails of the Egyptian boats are made of byblos; the priests read to me out of a byblos roll the names of three hundred and thirty kings.' With the possession of Egypt by the Greeks the use of papyrus increased, and was for many centuries an important branch of export from that country; and although linen, parchment, and other kinds of writing materials were used, we may infer from passages in antient authors that none was in so great demand as papyrus. The vast quantity of papyri found at Herculaneum proves the extensive use of it in Italy. At the commencement of the sixth century Cassiodorus (xi., Ep. 38), in one of his letters, congratulated the world on the abolition by king Theodoric of the high duty on imported papyrus; and speaks in animated terms of the usefulness and general use of that material. Papyrus continued to be used in Italy till about the eleventh or twelfth century, when it was superseded by cotton paper introduced from Asia. There is a papyrus at Ravenna, of the twelfth century, containing a brief of pope Paschal II. in favour of that archiepiscopal see.

The Egyptian papyri found in rolls under the swathings of mummies are often in a good state of preservation, but require great care in handling and unrolling them, being very dry and brittle to the touch. M. Jomard (*Description de l'Égypte*, vol. iii., p. 119) gives useful directions concerning the method for unrolling them. Papyrus rolls are also found in earthen vessels. The colour of the papyrus is a brownish yellow, and the characters and the drawings are in general perfectly legible; in some specimens the writing is of a good close black. A papyrus-book made of sheets of papyrus sewed together was brought from Egypt by Dr. Hogg, and is now in the British Museum. The MS. is a copy, in Greek, of part of the Psalms of David.

The papyri found at Herculaneum are burnt almost to cinders; and after all the trouble which has been taken, and the ingenuity that has been displayed in unrolling and deciphering many of them, little or nothing has been found worthy of the pains. They consist chiefly of Greek sophists and rhetoricians, works on music, medicine, and the arts, and some on natural and moral philosophy, &c. None of the lost historical works or fragments have been discovered among them. The work, 'Herculanensium Voluminum quae supersunt,' published at Naples, the last volume of which appeared in 1827, contains the text of the deciphered papyri. Many other Greek and Latin papyri of various ages are scattered about the various libraries and museums of Europe.

The papyrus reed has become scarce in Egypt; but it is recorded as still existing about the lake Menzaleh, near Damiat. There is a Sicilian water-plant resembling the papyrus, which is found in the Anapus near Syracuse, from which some samples of paper have been manufactured in recent times, according to the antient method for preparing papyrus, which is described by Pliny (xiii. 11, 12).

The name for paper in the Spanish, French, German, and English languages is derived from that of papyrus, whilst the Italian has retained the Latin word 'charta,' which was used for parchment and other materials for writing.

PAR OF EXCHANGE. [EXCHANGE.]

PAR VAGUM. [BRAIN.]

PARA', or, with its full title, *Santa Maria de Belem do Gram Pará*, is a town in Brazil, in 1° 18' S. lat. and 48° 22' W. long. It is built on the eastern banks of a wide river, which is formed by the confluence of the river Tocantins with the Tagipurú, or southern arm of the Amazonas, and is called Rio do Pará. Opposite the town the river is about seven miles wide, and this may be considered as its mean width to its mouth, a distance of more than seventy miles. This extensive sheet of water contains numerous low and woody islands, many of which are connected with one another by banks of mud, with only a few feet of water on them. The navigable channel is winding and generally of no considerable width. The approach of vessels to the town is accordingly rather difficult and tedious. On the south side of the town is the Rio Guamá, a considerable stream, which joins the Rio do Pará by a westerly course. The streets of Pará are wide and straight, and intersect one another at right angles. The houses are chiefly built of stone, but not high, consisting rarely of more than two floors and frequently of only one. They are only whitewashed, and frequently without glass windows. The cathedral is large and has a fine appearance. The best edifice in the town is the College of the Jesuits, now the residence of the bishop of Pará: a part of the building is occupied by the college, in which young persons study divinity. The church contiguous to the college has been converted into an hospital. The palace of the governor and the custom-house are also good buildings.

In 1820 the population was estimated at 24,500, and it has probably increased since that time. It consists of a considerable number of creoles and a larger number of aborigines, the number of negroes being much less in proportion than in other seaports of Brazil. The Indians are occupied as menial servants, fishermen, boatmen, and porters, but they do not exercise trades.

The commerce of Pará is considerable and increasing. The exports consist of sugar, rum, molasses, coffee, cacao, cotton, vanilla, copaiba, pitch, copal, fustic, timber, wood for cabinet-work, tobacco, ropes made from the fibres of palm-trees, sarsaparilla, rice, mandioc, starch, Indian-rubber, pechurim-beans, tonquin-beans, tamarinds, Cassia caryophyllata, indigo, arnotto, and Brazil nuts. To these must be added hides, horns, and horses: the horses are exported to the English islands in the West Indies, especially to Barbadoes. The latter articles are supplied by the island of Marajo, which lies opposite the town on the western side of the Rio do Pará. Only the sugar, rum, molasses, tobacco, cotton, and Indian-rubber are obtained in the vicinity of the town; the other articles are brought from the countries on both sides of the Amazonas, and frequently from a distance of a thousand miles and more. Pará sends several articles of European manufacture by way of the Amazonas and Rio Tapajos to the western interior province of Matto Grosso, from which it receives gold in exchange. Towards the end of the last century an attempt was made to transplant to the vicinity of this town cinnamon-trees, clove-trees, and nutmeg-trees, and though the plantations were afterwards neglected, they still exist, and supply small quantities of these articles for exportation.

The town was founded in 1615 by Francisco Caldeyra. At first its growth was slow, but since the middle of the last century, when Pombal formed a just notion of the importance of the country near the mouth of the Amazonas, he favoured this town, and it prospered accordingly. From that time to 1835 the town increased rather rapidly. In 1835 its prosperity was checked by an insurrection of the Indians of the province, who took possession of the town and kept it for about six months: but at present it has nearly recovered from the effects of that disastrous event.

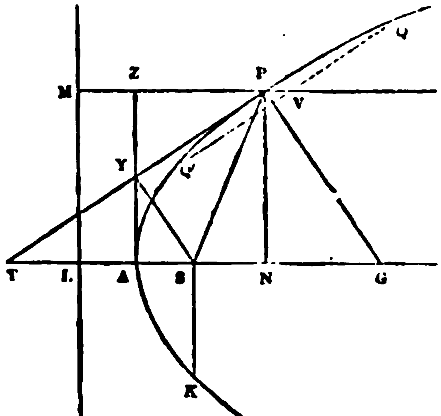
(Spix and Martius, *Reise in Brasilien*; Smyth and Lowe's *Journey from Lima to Pará*.)

PARABLE (παραβολή, 'a comparison or similitude') is defined by Bishop Lowth as 'a continued narrative of a fictitious event, applied by way of simile to the illustration of some important truth.' (*Praelect.* x.) It is a species of fable, and differs from the apologue by narrating events which, though fictitious, are not impossible to have happened. [Fable.] This mode of instruction is of great antiquity, especially among the eastern nations. In the Old Testament we have examples of it in the parable of Nathan to David (2 *Sam.*, xii. 1-9), in that of the woman of Tekoah (2 *Sam.*, xiv. 1-13), and repeatedly in the writings of the prophets (*Is.*, v. 1-7; *Ezek.*, xv., xvi., xix., xxxiii., &c.). The parable of Jotham, which is often spoken of as the most antient parable in existence (*Judges*, ix. 7-15), is properly an apologue. In the New Testament parables form a most marked feature of our Saviour's teaching. (See the gospels of Matthew, Mark, and Luke.) Lowth lays down as the essential qualities of a parable, that the image must be well known and applicable to the subject, and its meaning clear and definite; it must be elegant and beautiful in itself; all its parts and appendages must be perspicuous and pertinent; and the literal must never be confounded with the metaphorical sense.

Many of the Scripture parables are accompanied by an explanation, which, of course, fixes the sense. Where this is not the case, the intended meaning must be gathered from a consideration of the subject-matter of the parable itself, the context in which it occurs, and the circumstances under which it was uttered.

Besides its usual signification, this word is employed in the Scriptures in the following senses:—a proverb, a famous saying, a thing darkly or figuratively expressed, and a visible type or emblem.

PARA'BOLA. The probable origin of this name, as applied to one of the conic sections, may be seen in Rectangle. As in the case of the other Conic Sections [Ellipse and Hyperbola], we shall here give a small collection of the most remarkable properties of this curve.



1. Let a point P move in such a way that its distance SP from a fixed point S is always the same as its perpendicular distance PM from a given line ML. This point P describes what is called a parabola.

2. The line LS, perpendicular to LM, produced, is the *axis*, or principal diameter; and any line PV parallel to it is called a *diameter*. The point S is the *focus*, and the line LM the *directrix*. The ordinate SK drawn through the focus is called the *semi-latus-rectum*, and double of it is the *latus rectum*. The same phrase is used for the ordinate drawn through the focus of an ellipse or hyperbola.

3. SA is equal to AL, and SK to twice AS.

4. If an ellipse be described with the vertex A and the focus S, the farther the centre is from the point S, the more nearly will the part of the ellipse which falls within a given ordinate PN coincide with the corresponding part of the parabola: and the same of an hyperbola drawn with the vertex A and focus S. And a parabola may be considered as an ellipse or hyperbola with a given focal distance AS, and a centre at an infinite distance.

5. The tangent PT bisects the angle MPS, and SP is equal to ST, and AN to AT. The line SY drawn perpendicular to the tangent from the focus always meets PT in a point of the tangent drawn through A.

6. If PG be drawn perpendicular to PT, then SP is equal to SG, and NG is always equal to twice AS.

7. The square on PN is equal to four times the rectangle under AN and AS.

8. The area ANP is two-thirds of NZ, the rectangle under AN and NP.

9. If QQ′ be drawn parallel to PT through any point V of the diameter PV, QQ′ is bisected in V, and the square of QV is equal to four times the rectangle under SP and PV.

10. The square on SY is equal to the rectangle under AS and SP.

In applied mathematics the parabola was formerly of great importance, both as being the curve in which a comet was supposed to move, and as that in which a cannon-ball or other projectile would move were it not for the resistance of the air. It is still sometimes used as the approximation to the elongated ellipse in which a comet moves. For the more accurate investigations which deduce the real path of a projectile, see Gunnery.

PARABOLOID. The simplest form of this surface is the paraboloid of revolution, made by the revolution of a parabola about its axis. For the other meanings of the term, see Surfaces of the Second Degree.

PARACE'LSUS, the name commonly given to a very extraordinary person, who called himself by the compound and high-sounding appellation Philippus Aureolus Theophrastus Paracelsus Bombast, ab Hohenheim: to which is sometimes added the epithet *Eremita*. Of all these names it is difficult to say which, if any, really belonged to him; for though he seems to have liked *Theophrastus* better than any of the others, and sometimes (as in his will and his letter to Erasmus) called himself by that alone, and though he says, in his book called *Paragranum*, 'Et Naturæ et Baptismatis jure Theophrastus nominor,' still he was wont to pay so little regard to truth, either in his words or actions, that he cannot safely be believed even in such a trifle as this. The place of his birth is equally uncertain, but he is generally supposed to have been born in 1493, at Einsiedeln in the canton of Schwyz, the Latin name of which, 'Helvetiæ Eremus,' caused him to be sometimes called 'Eremita.' (See however Haller, *Biblioth. Med. Pract.*, tom. ii.) His father was a physician, and instructed him in alchemy, astrology, and medicine: he was never regularly educated, and he confesses himself that he was not fond of books and had a horror of languages, insomuch that at one time he did not open a book for ten years together. This is quite confirmed by the internal testimony of his writings, which are as unintelligible from their style as their substance. He soon commenced a wandering life, and spent some years in travelling over almost all Europe and probably several parts of Asia and Africa. He had a most ardent desire for information of all sorts, and neglected no opportunity of acquiring it; but he seems to have exercised very little judgment in the choice of his informants, and to have consulted conjurors, old women, and quacks of every description, quite as much as physicians and philosophers. The most valuable acquisition that he made in his travels was an acquaintance with metallic chemistry, by means of which he was enabled to perform several wonderful cures, and thereby laid the foundation of his fame. In 1526 he was chosen to be professor of medicine and natural philosophy at Basel, and commenced his course of lectures by lighting some sulphur in a brazen chafing-dish, and then throwing into the flame the works of Galen and Avicenna, exclaiming, 'Sic vos ardebitis in gehennâ.' He lectured partly in Latin and partly in German, which, together with his singular manners and the novelty of his opinions, rendered him extremely popular. In consequence however of a dispute with the magistrates about the amount of a fee which he demanded of one of the canons, he left Basel in about a year, and recommenced his wandering life. He seldom stayed long in one place, but lived chiefly in taverns, where he scarcely ever took off his clothes by day or night; and though he had hitherto lived a very temperate life, and taken nothing but water, he now spent whole nights in drinking with the lowest company. He still maintained his reputation by occasionally effecting some extraordinary cures by means of his powerful medicines, but his failures were equally conspicuous. At last, after passing through many vicissitudes, the boasted possessor of the philosopher's stone and the elixir of life died in great poverty in 1541, at Salzburg, in the Tyrol, at the early age of forty-eight.

As might be expected, Paracelsus has been as much extolled by his admirers as he was despised and abused by his accounts. With respect to his moral and religious character there seems to have been nothing to admire: he was totally destitute of piety, and his theological opinions (if they deserve to be called such) were a confused mixture of infidelity, heresy, and absurdity: in gluttony and drunkenness, in lying and charlatanism, in vanity and arrogance, he has been seldom equalled and never surpassed. If any one is inclined to think this judgment of him too harsh and severe, he will find it abundantly confirmed by the passages quoted from his own writings and those of his personal acquaintances by Le Clerc, in the Appendix to his 'Hist. de la Méd.' His intellectual talents and acquirements are not much more deserving of respect; but in order to estimate these fully, he must be considered—1, as a chemist; 2, as a physician; and 3, as a philosopher. 1. As a chemist (though probably the ablest of his time), he falls far short of his predecessor Basil Valentine. 'His original discoveries,' says Brande, in his 'Manual of Chemistry,' 'are few and unimportant, and his great merit lies in the boldness and novelty which he displayed in introducing chemical preparations into the *Materia Medica*, and in attacking the prejudices of the Galenical physicians against the productions of the laboratory. But though we can fix upon no particular discovery on which to found his merits as a chemist, and though his writings are deficient in the acumen and knowledge displayed by several of his contemporaries and immediate successors, it is undeniable that he gave a most important turn to pharmaceutical chemistry, and calomel, with a variety of mercurial and antimonial preparations, as likewise opium, came into general use.' He pretended [illegible] to possess the secret of the philosopher's stone and the elixir of life, besides various other preparations called by strange and uncouth names, such as 'the Quintessence,' 'the Arcanum of Vitriol,' 'Azoth,' &c.: the composition of his 'Laudanum' he is supposed never to have revealed, and in the short dictionary at the end of his works we are merely told that 'Laudanum Theophr. Paracelsi est medicina laude dignissima ex duabus tantum rebus constans, quibus excellentiores in mundo reperiri nequeunt: quæ morbos omnes fere sanat.' 2. As a physician he cannot lay claim to any scientific skill; and though his epitaph declares that 'Lepram, Podagram, Hydropisam, aliaque insanabilia corporis contagia mirificâ arte sustulit,' we are told on the other hand that 'he killed many of his patients, or at least made them worse than they were before.' (Libavius, *Hist. Panac.* [illegible], quoted by Le Clerc.) His medical writings are full either of credulity or imposture. He says that it is possible for a man alone to create a living child resembling in every respect those born of women, only much smaller, and he gives directions for doing so, too absurd and indecent to be quoted. He explains minutely the analogy which he supposes to exist between the *Macrocosmus*, or external world, and the *Microcosmus*, or human body, and says that every physician ought to be able to point out in man the east and west, the signs of the zodiac, &c. (*Paragranum*, Tract. 2.) He says that the human body consists of nothing but sulphur, mercury, and salt. (*Paramirum*, lib. 1.) He professes his belief in magic (though in this he was not more credulous than his contemporaries), and boasts of having received letters from Galen, and of having disputed with Avicenna in the vestibule of the infernal regions. (*Paragranum*, Præf.) Some of his most remarkable cures were cases of syphilitic and other obstinate ulcers, and his 'Chirurgia Magna' and 'Chirurgia Minor' have been more esteemed than perhaps any of his other works. In extracting an arrow or other weapon from a wound, he recommends (when all other means fail) the use of certain *verba constellata*, which will infallibly succeed. 3. With respect to his philosophical (or theosophical) opinions, it is very difficult to discover what they were, not only from the great obscurity of the subject-matter of his works, but also from the new words that he employs, and still more from the peculiar and arbitrary sense that he puts upon those in common use. Iliaster, [illegible], Aniadum, [illegible], Cagastrum, Evestra, Trarames, [illegible], &c., are some of those invented by himself, and of which no intelligible explanation is to be found. 'He made great use,' says Tennemann (*Manual of Philos.*) 'of the cabalistic writers, whom he endeavoured to render yet [illegible] and expounded with a lively imagination. Among the principal mystic notions were those of an internal illumination as an emanation from the Divinity, the universal harmony of all things, the influence of the stars on the sublunary world, and the vitality of the elements, which he regarded as spirits encased in the visible bodies presented to our senses.' 'These are,' says Hallam (*Liter. of Europe*) 'the sylvans, sylphs, undines, or nymphs, gnomes, and salamanders. It is thus observable that he first gave these names, which rendered afterwards the Rosicrucian fables so celebrated. These live with man, and sometimes (except the salamanders) bear children to him; they know future events and reveal them to us; they are also guardians of hidden treasures, which may be obtained by their means.' The writer may apologize in Hallam's words, and confess that 'he may perhaps have said too much about paradoxes so absurd and mendacious; but literature is a garden of weeds as well as of flowers, and Paracelsus forms a link in the history of opinion which should not be overlooked.' His works, part of which are written in German and part in Latin, and of which a complete list is given by Haller, in his 'Biblioth. Medic. Pract.,' were published in Latin at Frankfort, 1603, in 10 vols. 4to., and in German, by Huser, at Basel, 1589-90, also in 10 vols. 4to. For more particulars respecting Paracelsus and his opinions, see Le Clerc, *Hist. de la Méd.*; Sprengel, *Hist. de la Méd.*; Brucker, *Hist. Crit. Philosoph.*; Rixner und Siber, *Leben und Lehrmeinungen berühmter Physiker*, &c., heft 1, Sulzb., 8vo., 1819.

PARACENTRIC, or 'towards the centre,' a term sometimes used, as in paracentric velocity, which means the rate at which a moving body approaches a certain centre without reference to the rate at which it moves in space.

PARACEPHALO'PHORA, M. de Blainville's name for his second class of *Malacozoaria*, which is divided by him into the subclasses *Paracephalophora dioica*, *Paracephalophora monoica*, and *Paracephalophora hermaphrodita*. [MALACOLOGY.]

PARACHUTE, a French word, signifying a means of preventing a fall. The first part of the word, *para*, is perhaps of Greek origin; the second part is the French word *chute*, a fall, which is of Latin origin.

A parachute is a machine attached to a balloon, and is intended to convey the aëronaut gently to the earth, in case of an accident happening to the balloon. It is in shape like an umbrella, and its construction may be understood by supposing the umbrella to be large and strong; to be provided with ropes or stays fastened to the extremities of the whalebones, and brought down to the handle, where they must be fixed, so as to prevent the umbrella from turning inside outwards. Instead of the stick, suppose a metal tube to be fixed in the centre, with a rope passing through it, attached by its upper extremity to the balloon, and by its lower end to a tub or car. This machine is a parachute: while ascending, it will be like a closed umbrella, but it may at any moment be detached from the balloon by cutting the end of the rope which is tied to the car; the resistance of the air will then cause it to expand, and will at the same time retard the velocity of descent.

The idea of using such a machine to break the fall from a high place is not new. Nearly two centuries ago De la Loubère relates that a man was in the habit of amusing the court of Siam by descending from a considerable height with such a contrivance. He used two umbrellas, fastened by long slender handles to a girdle tied round his waist; 'le vent le portoit au hazard, tantost à terre, tantost sur des arbres, ou sur les maisons, et tantost dans la rivière' (vol. i., p. 146, Amsterdam, 1691). The experiment was repeated in France in 1783, by M. le Normand, who leaped safely from the window of a house with a stout umbrella in his hand of thirty inches in diameter. The descent from a balloon was first tried on a dog by Blanchard, at Strasburg, in August, 1787. The animal was detached at a height considerably greater than a mile, and he reached the ground in safety. Blanchard was less fortunate in a subsequent experiment on his own person at Basle, where he broke his leg by too rapid a descent. Garnerin was the next adventurer; he succeeded in a trial at Paris on the 21st of October, 1797, though the parachute oscillated a good deal. On the [illegible] of September, 1802, Garnerin made a second descent, which was less successful than his first; he left St. George's Parade, North Audley Street, in a parachute thirty feet in diameter (one account says twenty-three feet), rose in about eight minutes to a height estimated at 4000 feet, and then cut the rope which attached him to the balloon. Unluckily the parachute remained closed, and for a few moments its motion was frightfully rapid; but at length it burst open with some violence, and the descent became gradual; the shock, however, had caused such an oscillation in the machine that it appeared to the spectators to be at times quite horizontal. But the vibration diminished as the parachute neared the ground, and Garnerin alighted safe in a field near the Small-pox Hospital in St. Pancras. But although safe, he was unable to speak, blood issued from his ears and nose, and he was in a state of great agitation; he had received a severe shock from the first rapid descent, and its sudden cessation; but the consequences were less serious than might have been anticipated, and he was well enough in a few minutes to address the crowds assembled to witness the attempt; the same shock had broken one of the stays, and this probably was partly the cause of the great oscillation. We are not aware that Garnerin ever repeated the experiment, but the writer of this notice in 1816 twice witnessed the descent of Miss Garnerin, his daughter, from great elevations; in both cases the fall was gradual and easy; and in one he saw her in less than a minute after she reached the ground, and before she left the car; she did not then appear in the smallest degree discomposed.

An unhappy and fatal experiment was recently tried in London by Mr. Cocking. This gentleman (incorrectly in our opinion) attributed the dangerous vibration of Garnerin's parachute to its general form; and supposed that if, instead of having the hollow side downwards, a parachute were made like an umbrella turned upside down, there would be no disturbance in its descent. He therefore made one in this form. The diameter was thirty-four feet, and as it would have a tendency to close in its descent, he endeavoured to prevent this by putting a heavy wooden hoop around it; it had also a hole in the middle six feet in diameter. The balloon to which this ponderous machine was attached left Vauxhall Gardens on the 24th of July, 1837, and the consequence was what might have been anticipated. As soon as the parachute was cut away, it fell with rapidity; its vibrations were violent, the large hoop broke, and Cocking fell, dreadfully mutilated, at Lee near Blackheath, about six miles from the scene of his ascent.

The result had nearly been equally fatal to the persons in the car of the balloon: the sudden liberation of the parachute caused such a rapid ascent that the gas was forced out with great rapidity, and for nearly five minutes they were so completely enveloped with it that for a time they were deprived of sight and suffered great pain. Most luckily they had provided a large silken bag full of atmospheric air and furnished with two metal tubes; these they applied to their mouths, and were thus enabled to breathe; without such a precaution suffocation would have been inevitable.

Three formulas have been given for calculating the velocity of descent of a parachute. They are—

$$26\sqrt{\frac{w}{d^2}} = v$$

$$28\cdot28\sqrt{\frac{w}{d^2}} = v$$

$$32\cdot98\sqrt{\frac{w}{d^2}} = v$$

in which w is the weight in pounds avoirdupois; d, the diameter of the parachute; v, the number of feet fall per second.

According to the first of these, if a parachute be 50 feet in diameter and weigh 529 lbs., it will fall 11·96 feet in a second; according to the second, the fall will be 13·01 feet; according to the third, 15·17 feet: the truth may lie between.

In these three cases, the shock felt on landing would be nearly equal to that caused by a leap from heights represented by the following three formulas respectively:—$10\cdot5\frac{w}{d^2}$; $12\cdot4\frac{w}{d^2}$; $16\cdot9\frac{w}{d^2}$; being, under the given circumstances, something less than 2 feet 3 inches, 2 feet 8 inches, and 3 feet 7 inches.

PARACYANOGEN. When cyanogen is obtained by heating bicyanide of mercury in a retort, there remains in it a dark-coloured substance, which was found by Professor Johnston to be similar in composition to cyanogen, that is, composed of 2 equivalents of carbon 12, and 1 equivalent of azote 14 = 26. It appears therefore that it is a bicarburet of azote, isomeric with cyanogen, but differing from it essentially in its physical and chemical properties, the paracyanogen being solid and cyanogen gaseous in its form. This compound is also formed when mercury is kept in an alcoholic solution of cyanogen.

Paracyanogen is soluble in sulphuric and nitric acids, and forms a compound in which an equivalent of oxygen is combined with 8 equivalents of carbon and 4 equivalents of azote: it is therefore probably composed of these proportions of the last-named elements.

PARADISE (παράδεισος) is a word of Persian origin, signifying a kind of park or pleasure-ground enclosed with walls, and well watered and planted, and stocked with animals for the chase. (Pollux, ix. 13; Gellius, ii. 19.) It was adopted into the Greek language, and applied to any pleasant place. The Septuagint translators use this word for גַּן־עֵדֶן, the *garden of Eden*, where God placed the first man upon his creation. (*Gen.*, ii. 8; iii. 23.) Respecting the situation of this place we are told, in *Gen.* ii. 8-14, that it lay eastward in the land of Eden, and that it was watered by a river, which, after passing through the garden, divided into four streams, of which the first, Pison, compassed the land of Havilah, where there was gold, bdellium (either the pearl or a sort of gum resin), and the onyx stone; the second, Gihon, compassed the land of Cush; the third was Hiddekel (the Tigris), which went towards the east of Assyria; the fourth was the Euphrates. Any attempt therefore to determine the site of Paradise must have for its object to find two other rivers which are so connected with the Euphrates and the Tigris that they all four may have been branches of one chief stream. Calvin, Bochart, and others attempt to solve the difficulty by supposing the words in *Gen.* ii. 8, to mean that the river which flowed through Paradise in one stream was formed by the confluence of two rivers where it entered the garden on the north (namely, the Euphrates and the Tigris), and that it divided into two others where it left the garden at the south, namely, the two mouths of the river formed by the union of the Euphrates and Tigris, now the *Shat el Arab*. On this hypothesis Cush corresponds to the present Khuzistan, the antient Susiana, or Kissia, and Havilah to the neighbouring part of Arabia, which in antient times did produce gold, and in which Strabo places a people called Χαυλοταῖοι (xvi. 767). Eden would then stand near the modern Korna, at the confluence of the Tigris and Euphrates. To this theory it has been objected that it uses the word Cush in a sense not supported by the other passages of Scripture in which that name occurs; that it is not clear that the *Shat el Arab* had antiently two mouths, and that if it had, such streams would not be spoken of as rivers of the same class as the Euphrates and Tigris; and lastly, that the interpretation put upon the words of *Gen.* ii. 8, is not a natural one.

Another theory places Paradise in the neighbourhood of Babylon, and finds the Pison and Gihon in two of the canals of the Euphrates.

Reland and Calmet place Eden in the high lands of Armenia, considering that the text (*Gen.* ii. 8) points to a position near the *sources* of the four rivers. They make the Pison the Phasis, the Gihon the Araxes (which is still called by the Persians *Jihon*), Havilah the land of Colchis, and Cush the country of the Cossæi (Strabo, xi. 522; xvi. 744; Diod. Sic., xvii. 111). The opinion of Michaelis is only slightly different from this; he takes the Gihon to be the Oxus. The Phasis of the antients however rose not in Armenia, but in Colchis.

Some writers suppose that the deluge has so altered the physical features of Asia, that it is in vain to search for a place answering to the description given in *Genesis*. But any one must perceive that the author of that book could have no object in writing the minute account which he has given of the position of Paradise, if some spot corresponding to his description did not exist on the face of the earth when he wrote. It must be admitted however that all the attempts hitherto made to discover the true position of the place are perfectly unsatisfactory.

(Winer's *Biblisches Realwörterbuch*, art. 'Eden;' E. F. C. Rosenmüller's *Handbuch der Bibl. Alterthumsk.*, i. [illegible] 172, &c.)

Paradise, in the New Testament, is used for the abode of the departed spirits of the good between death and the resurrection.

(Kuinoel, *Nov. Test. Lib. Hist.*, note on *Luke*, xx[illegible] Doddridge's *Family Expositor*, note on 1 *Cor.*, xii. 4. [illegible]ley's 26th *Sermon*.)

PARADISEA (Zoology). [Bird of Paradise.]

PARADISI, COUNT AGOSTINO, was the grand-nephew of Agostino Paradisi, author of the 'Ateneo dell' Uomo nobile.' He was born at Vignola, in the terri-

Reggio, April 25th, 1736, and was educated at the Collegio Nazareno at Rome, on returning from which he prosecuted his studies diligently, and among the rest, applied himself to that of English literature. His talent for poetry displayed itself at an early age, and when only sixteen he was admitted member of an 'accademia' at Reggio, where both his poetical compositions and his dissertations obtained for him great distinction. He afterwards visited Genoa, Venice, and Bologna, in which last place he became acquainted with the Marquis Albergati Capacelli, and shared with him in some of his dramatic compositions. On the death of the Abbate Salandri, in 1771, Count Firmian, the Austrian minister, invited Paradisi to accept the office of perpetual secretary in the academy of Mantua; but the duke of Modena appointed him professor of civil economy and lecturer on belles-lettres in the university of that city; and afterwards (1774) bestowed on him the title of count. During the eight years that he filled that chair, his lectures obtained for him the applause not only of his own countrymen, but of many eminent foreigners. In 1780 he returned to Reggio, where he held a distinguished civil employment, devoting his leisure to literary pursuits; but his health now began to decline, and he was attacked with dropsy in the chest, which disorder carried him off, February 19th, 1783, in his forty-seventh year.

Besides his '*versi sciolti*,' or poems in blank verse, which are esteemed both for their elegance of style and their moral value, he published three volumes of tragedies, translated from the French, including an original one entitled 'Le Epitidi.' Among his prose writings, his éloge on Montecuccoli is considered a masterpiece of its kind. His 'Saggio sopra l'Entusiasmo nelle Belle Arti,' shows his ability as a philosophical critic; while his knowledge of jurisprudence and civil economy is displayed in his 'Parere Economico' and other productions of that kind.

PARADOX (from *παράδοξος*, 'contrary to received opinion,') is a term applied to a proposition which is opposed to the general belief, or to one which appears at first sight to contradict some previously ascertained truth. The nature of a paradox and the distinction between it and a contradiction is clearly explained in the following sentence from Bishop Horsley's 19th Sermon:—'When two distinct propositions are separately proved, each by its proper evidence, it is not a reason for denying either, that the human mind, upon the first hasty view, imagines a repugnance, and may perhaps find a difficulty in connecting them, even after the distinct proof of each is clearly perceived and understood. There is a wide difference between a paradox and a contradiction. Both indeed consist of two distinct propositions, and so far only are they alike; for of the two parts of a contradiction, the one or the other must necessarily be false; of a paradox, both are often true, and yet, when proved to be true, may continue paradoxical. This is the necessary consequence of our partial view of things. An intellect to which nothing should be paradoxical would be infinite. . . . In all these cases there is generally in the nature of things a limit to each of the two contrasted propositions, beyond which neither can be extended without implying the falsehood of the other, and changing the paradox into a contradiction; and the whole difficulty of perceiving the connection and agreement between such propositions arises from this circumstance, that by some inattention of the mind these limits are overlooked.'

This word was also used by the Greeks for a remarkable saying. Cicero, in his work entitled 'Paradoxa,' illustrates six of these paradoxes, borrowed from the Greek stoics. These propositions are the following:—1, The honourable is the only good. 2, Virtue is sufficient for happiness. 3, All sins and right actions are equal. 4, Every fool is mad. 5, The wise man alone is free, and every fool is a slave. 6, The wise man alone is rich.

PARAFFIN. [Hydrogen—*Carburets*.]

PARAGUAY is a republic of South America, situated nearly in the centre of that continent, between 20° and 27° 30′ S. lat., and 55° and 62° W. long. It extends in length from south to north about 500 miles, and its average width may be about 200 miles. The area consequently may be estimated at about 100,000 square miles, or perhaps somewhat less; so that it covers a surface of about 16,000 square miles more than Great Britain. On its western side runs the Paraguay river, which divides it from the desert called the Gran Chaco, which is included in the territories of the federal republic of La Plata. On the east and south flows the Paraná, which separates it from the Brazilian province of S. Paulo, and from the state of Corrientes, which is a part of the republic of La Plata. On the north it borders on the Brazilian province of Matto Grosso, and in this part the boundary-line runs partly along the range of the Amambahy Mountains, and partly follows the course of the river Yvineima. The northern frontier however is not exactly determined, as the greater part of it is still in the possession of two independent tribes of natives, the Mbayas and Guaycurús, and no settlements of whites have been formed either on the side of Brazil or on that of Paraguay.

Surface and Soil.—The northern part of the country is mountainous. From the Serra Seyada, one of the mountain ranges which traverse the middle of Brazil from east to west, a branch detaches itself near 55° W. long. and 17° S. lat. This branch runs for some distance south-south-west, and then south, dividing the tributaries of the Paraná, which run east, from those of the Paraguay, which run west. This range is called Sierra Amambahy, and under that name it enters Paraguay near 20° S. lat. It continues in a southern direction to the vicinity of 24° S. lat., where it turns eastward and terminates on the banks of the Rio Paraná, opposite the Salto Grande de Sette Quedas. [Brazil.] This range is called Sierra Maracaju, where it runs west and east. That portion of Paraguay which lies on the east and north of this range is little known, as it is possessed by native tribes, and only occasionally visited by whites. It seems to have a very broken surface, exhibiting a succession of valleys and ranges of high hills, all covered with tall forest-trees. The rivers which descend from it are full of rapids and cataracts. The country west of the Sierra Amambahy seems to be less mountainous, but has likewise a broken surface, and its rivers run with great velocity, though their course is less interrupted by rapids. It is also well wooded, and in general of great fertility, but hitherto the whites have not settled in this part. Thus it may be said that one half of the countries included within the boundary of Paraguay, properly speaking, do not belong to it.

The remainder, or that part which is situated south of 24° S. lat., is one of the most fertile and most pleasant countries of South America. The greater part of the surface is a succession of hills and gently sloping eminences, and broad open valleys intersected here and there with lakes. The lower grounds and plains are in some tracts *savannahs*, and afford excellent pasture-ground; single palm-trees are dispersed over them. The hills and slopes however are wooded from the top to the bottom, and frequently with stately forest-trees. The vigorous vegetation shows the great fertility of the soil, which is still more evidently proved by the extent of cultivation. Though cultivation generally occurs only in detached patches and isolated tracts, it is certain that no part of the interior of America has so large a proportion of the soil under cultivation as the southern half of Paraguay. But there are some tracts less favourable for agriculture. Nearly thirty miles south of Assuncion begins a low tract of alluvial soil, which is covered with extensive marshes partly occupied by shallow pools of water. It is several miles in width, and extends along the Paraguay to its junction with the Paraná. Though in general destitute of trees, it is separated from the banks of the river by forests, which supply occupation to a small number of wood-cutters, the only inhabitants of this tract, who are frequently swept away by diseases engendered by the vapours which rise in hot weather from the swamps. Near the place where the Paraguay joins the Paraná the country is more elevated, and its surface is overgrown with thorny acacias and underwood of every kind. But along the Paraná other tracts of marshy ground of a similar description extend as far as the island of Apipé, from which to the Salto de Sette Quedas the hills and elevated ground come close up to the banks of the river. This latter tract however is less populous and cultivated than the centre and western part of the country, apparently not from want of fertility, but because it has not the same means of sending its produce to market.

Rivers.—The two rivers which enclose Paraguay on three sides differ greatly in their character as navigable rivers. The Paraguay is navigable in all its extent within this country, though its course is rather rapid at its northern extremity near the rocky barrier called Fecho dos Morros (21° 20′ S. lat.). [Brazil, v., p. 356.] Vessels of 200 tons burthen may ascend it as far as Assuncion, and smaller vessels several hundred miles within the boundary of Brazil. The Paraná, which runs along the eastern side of the country, is much less favourable to navigation. The great cataract, called Salto de Sette Quedas, near 24° S. lat. [BRAZIL, v.. 357], forms an insuperable impediment to navigation. Even lower down there occur several difficult passages, where the river descends in long rapids over rocky shoals; the last cataract occurs at the island of Apipé, where the river runs westward to its junction with the Paraguay. Vessels of 300 tons burthen ascend to this island to take in timber. Some of the smaller rivers which join the Paraguay, are navigable to a short distance from their junction with it, but one of them, the Tibiquari, is navigable above a hundred miles. It drains the southern portion of the country, and falls into the Paraguay near 26° 30′.

Climate and Productions.—Paraguay enjoys the advantages of the intertropical rains. The rainy season occurs in the months when the sun is in the southern hemisphere. The rains are far less abundant than nearer the equator, but sufficient to bring the fertility of the soil into full action. No meteorological observations have been published. In general the climate is said to be pleasant, and the heat rarely oppressive. The country is healthy, except the swampy tracts already noticed.

The principal articles cultivated as food are maize, batatas, mandioc, yucca-root, and beans. The cultivation of the sugar-cane, tobacco, and cotton is rather extensive. The principal fruit-trees are oranges and figs. With the exception of the yucca-root, the vegetables are bad, and consist chiefly of onions, capsicums, and garlic. Water-melons and musk-melons are abundant and good.

Paraguay possesses great wealth in its forests, which contain numerous species of lofty timber trees, and dye-woods for tanning and other purposes. Several of them produce gums and Indian-rubber, and others are used for cabinet-work. All the vessels that navigate the rivers Paraguay and Paraná are built of timber supplied by this country, and the ropes are made of the fibres of different plants which grow there, but it is said that they are soon spoiled by friction or water. The most remarkable of the trees is that which yields the famous herb called *maté*, or Paraguay tea [TEA, PARAGUAY], and which is extensively used in the southern countries of South America as a beverage. The country which separates the *yerbales* (or forests from which the leaf is procured) from the Paraguay is without cultivation, and covered with thorny trees intersected by marshy grounds.

As Paraguay does not contain such extensive prairies as those which occur in all the surrounding countries, the number of horses, mules, and cattle is not so great, but it is sufficient for the internal consumption. Most of the animals peculiar to South America are found in this country; and the monkeys commit great depredations on the fruit-trees and corn fields. Various kinds of birds, as parrots and paroquets, pheasants, toucans, humming-birds, and cockatoos, are numerous. The royal duck, or pato-real, is nearly as large as a goose, with a red and varied plumage. Wild bees are found in great numbers in the woods, and both honey and wax constitute articles of export. The large ants of this country have attracted the attention of naturalists on account of the extensive habitations which they build. The mineral productions are not known. According to the statement of the Jesuits, there is neither iron nor copper in this country.

Inhabitants.—The population of Paraguay is differently stated between 300,000 and half a million. In a few of the towns and their vicinity live a comparatively small number of whites, and a larger number of mestizos, or descendants of Spaniards and Indians. The latter have the air and appearance of descendants of Europeans. Both these classes understand and commonly speak the language of the Guaranis. This numerous tribe of aborigines, owing to the unremitting care of the Jesuits for a period of about eighty years, have almost entirely adopted the agriculture and arts of Europe, as far as they are fit for a nation inhabiting a country different in climate and other natural features. The Guaranis compose the bulk of the population, and in their manners and civilization approach nearer the whites who reside among them than any other of the aboriginal tribes of America: it may therefore be hoped that in course of time the whole population will coalesce in such a manner as to constitute one nation, by which all that animosity will be removed, which, in other parts of America, exists between the different races inhabiting one country. The political events which, in the last thirty years, have occurred in Paraguay, must greatly contribute to bring about such a union between these races. Some other tribes, as the Payaguas and Nalicunga, are dispersed among the Guaranis, but they consist of a small number of individuals.

Political Division and Towns.—The republic is divided into eight departments, called, after their capitals, Assuncion, Concepcion, Santiago, Villa-rica, Curuguaty, Candelaria, S. Fernando, and Santa Hermengilda. The capital of the republic is Assuncion, which is built near the banks of the Paraguay river, in the form of an amphitheatre. Properly speaking, the town consists only of one street of considerable length, which is surrounded by several lanes, and a great number of small houses, standing apart, and surrounded by groves of orange-trees. Most of the houses are small, even in the principal street, and consist only of a little shop with two or three apartments attached to it. The main apartment generally opens directly on the street, without any intervening passage. Few of the houses have flat roofs; the greater part are covered with tiles. The cathedral is a building without any pretensions. The government-house is an extensive edifice, but it has only one floor, and is built without taste. The best buildings of the town are a few convents. The inhabitants are mostly the descendants of Europeans and Indians; there are a few negroes, but not many mulattoes among them. The population amounts to about 10,000 souls. Some of the other towns are said to contain from 2000 to 4000 inhabitants, as Villa Reale de Concepcion, Villa-rica, Curuguaty, Cazapá, and Neembucu.

Commerce.—A country so fertile and so rich in vegetable products as Paraguay, besides being inhabited by a population accustomed to the wants of Europeans, might carry on a considerable commerce, and such indeed was carried on before its independence, when it had a free intercourse with Buenos Ayres and the other towns of La Plata. The exports from Paraguay to Buenos Ayres alone were then estimated at one million and a half of dollars, or 337,5[illegible]. They consisted of about eight million pounds of maté, or Paraguay tea, of one million pounds of tobacco, besides cotton, sugar, molasses, spirits, &c. As the countries farther south are either entirely destitute of trees or have no timber-trees, the exportation of timber was very considerable, and most of the vessels were built in Paraguay. But since Dr. Francia has become dictator, he has forbidden all commerce with foreign nations, and even with the neighbouring provinces, and he allows no one to leave Paraguay when he has once entered it.

History.—After the Spaniards had discovered the wide embouchure of the La Plata river, they sailed upwards, and tried to establish a colony on the banks of the river. But two attempts of this kind failed. The settlements contained only a small number of settlers, who were soon destroyed by the warlike natives of the plains. In 1535, the Adelantado, Don Pedro de Mendoza, was sent with a considerable number of vessels to found a great colony. He did not consider the naked countries on both sides of the river fit for such a purpose, and therefore he sailed up the Paraná and Paraguay for nearly a thousand miles, until he came to Paraguay, where he founded the town of Assuncion. From this place the Spaniards by degrees spread over all the countries of South America south of 20° S. lat. and east of the Andes. In the sixteenth century, the Jesuits were sent to those parts for the purpose of converting the natives to Christianity. Their success was not great until they obtained from the Spanish court a mandate (about 169[illegible]) forbidding all other Spaniards to enter their *Misiones* without their permission. The Jesuits settled among the numerous tribe called the Guaranis, on both sides of the river P[illegible], above the island of Apipé, and succeeded in bringing them to a certain degree of civilization. When the Jesuits were expelled, in 1767, the Misiones were inhabited by more than 100,000 civilised Indians, of whom perhaps less than one-half the number were in Paraguay. They afterwards dispersed through different parts of La Plata, but it seems that the majority settled in Paraguay, which after that time was entirely subjected to the viceroy of Buenos Ayres. In 1810, when a government was constituted in Buenos Ayres, independent of the then existing authorities in Spain, Paraguay refused to acknowledge this government, and defeated General Belgrano, who had been sent to bring Paraguay to obedience. The country soon after declared its independence. After some changes in the government, Doctor Gaspar Rodriguez de Francia became dictator; and though his measures do not agree with our conceptions of a wise government, he has preserved the country from all the misery which the other South American republics have constantly experienced in their continual dissensions and civil wars. His policy of excluding all foreigners from the country must contribute greatly to consolidate the different elements of the population into one mass, and to form them into a nation.

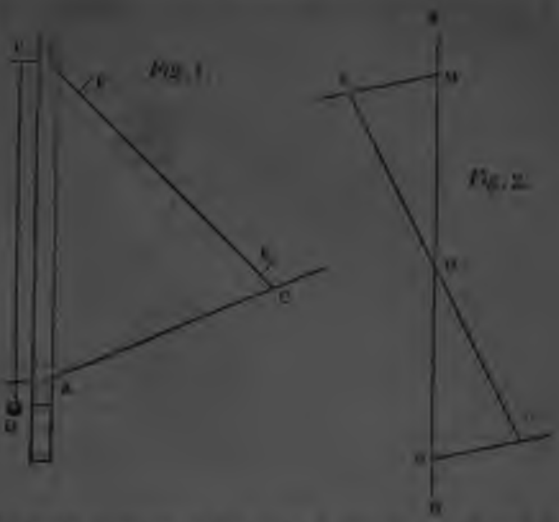
(*Parish's Buenos Ayres and the Provinces of the Rio de la Plata*; Robertson's *Letters from Paraguay*; Beaumont's *Travels in Buenos Ayres*.)

PARAGUAY TEA. [TEA, PARAGUAY.]

PARAIBA, or more correctly **PARAHYBA**, is a river in Brazil. It drains the littoral region of that country, which extends between 41° and 47° W. long. and between 21° and 23° 30′ S. lat., and is enclosed on the south by the Serra do Mar, and on the north by the Serra de Mantequeira and one of its branches called Serra do Frecheira. This river has a comparatively short course, but deserves notice because it drains the country lying to the north of the capital of the Brazilian empire, and is the first important river to be passed in proceeding into the interior of that country. The valley enclosed by the two ranges above mentioned is traversed longitudinally by a ridge of mountains of inferior elevation, called Serra do Parahyba. The river rises, where this inferior ridge is connected with the Serra do Mar, near 44° 30′ W. long., and flows, under the name of Parahytinga, westward, until, after a course of about 100 miles, and near 46° W. long., it turns north-east by a bend forming a very acute angle near the Aldea da Escada. As the river in this upper part of its course descends in a valley, the slope of which is considerable, the current is too rapid to admit any kind of navigation. From the Aldea da Escada the river runs east-north-east through a valley enclosed by the Serra de Parahyba on the south and the Serras de Mantequeira and Frecheira on the north, until it falls into the Atlantic about 20 miles north of Cape de S. Thomé, near 41° W. long. Its course in this valley exceeds 400 miles, so that it runs altogether above 500 miles. From the Aldea da Escada to the small town of Pindamonhangaba, a distance of 30 miles, the level part of the valley is some miles wide, and the current of the river rather gentle and regular, and it is accordingly navigated. Lower down however there occur several rapids and falls, as the valley grows narrower and the mountains approach close to the banks of the river. About 20 miles below Lorena, the bed of the river, which has enlarged to the width of half a mile, is contracted to about 10 yards by a long wall of rock on both sides, which is more than 40 feet high and 400 yards long. Farther down it receives the waters of two considerable tributaries, the Rio Parahybuna and Rio Pomba, each of which runs above 100 miles. The last of its numerous falls is that of S. Fidelis, which is somewhat more than 30 miles from its mouth, and to this place the current large river boats ascend. The greater part of the valley of this river is still in its natural state, being covered with trees of high growth, which more than in any part of Brazil exhibit that vigorous vegetation by which the maritime districts of that empire are distinguished. This is chiefly to be attributed to the great moisture of the air in a valley enclosed by mountains, and consequently not exposed to any wind. Cultivation has not yet made great progress, except in the wider portion of the valley, between the Aldea da Escada and Pindamonhangaba, where Indian corn and mandioca, as well as several other intertropical products, are raised, especially sugarcane and tobacco, for the cultivation of which the climate and soil seem very favourable. (Spix and Martius, *Reise in Brasilien*; Southey's *History of Brazil*.)

PARALLACTIC INSTRUMENT, or *Ptolemy's Rules*, the name given to an instrument invented by Ptolemy for determining the moon's parallax, and described by him, *Almagest*, lib. v., c. 12.

AB, BC, *fig.* 1, are two stout wooden rods turning on a pin, or centre at B; BA = BC; AC is a third divided rod, also turning on a pin at A, and passing through a loop at the extremity of the rod BC at C. PQ, a plumb line by which AB is adjusted vertically; E, F, two sights fixed on BC. It is evident if A B be truly perpendicular and any object be seen in the direction EF, that AC will be the chord of the angle ABC, that is, of the zenith distance of the object. AC may be divided as a scale of equal parts, and the angle deduced from a table of chords, or as a line of chords to radius A B, in which case the angle may be read off at once.*



A figure of a similar instrument may be found in Tycho Brahe, *Astron. Instaur. Mechanica*, sheet C. We have thought *Ptolemy's Rules* worth notice chiefly as pointing out a very cheap and accurate instrument for obtaining the time by the method of equal altitudes. Let A B be a rod turning on pivots above and below, for instance, between the sill and architrave of a window, and capable of being set perpendicular by a plumb-line, supposed in the figure to hang behind A B. E C, a stout edge-bar turning round a pin at O, and fixable in any direction by two laths, E M, C N. On E C a telescope is lashed (one sufficient for the purpose might easily be made of a tin tube and spectacle-glasses), with one or more horizontal wires placed in the focus. If the times of contact of the sun's limbs with the horizontal wires be observed in the forenoon and again in the afternoon (the axis A B being in both cases truly adjusted, and the instrument in other respects unchanged), the data will be obtained for finding the time shown by the watch when the sun is on the meridian, *i.e. apparent noon*, with great accuracy and very little calculation. (See Schumacher's *Hülfstafeln*, p. 40, &c.; Baily's *Tables*, pp. 32, 148, and many other collections.) The determination of the error of the watch by equal altitudes of the same star is even more simple, as there is then no motion in declination to be allowed for, and the middle time by the watch of similar observations is the time when the star passes the meridian, or its right ascension, which is known from the *Nautical Almanac*, or from well-known catalogues. The observer must be very careful to adjust the instrument by the plumb-line to the same position in both observations, and he must have a watch which will keep time correctly for the interval.

Sometimes the word *parallactique* is used to signify the instrument known to us by the name of EQUATORIAL. Lalande, *Astronomie*, § 2376, says the proper word is *parallatique*, or that which follows the *parallel* of stars; he reserves *parallactique* for *Ptolemy's Rules*.

PARALLAX, παράλλαξις, used in astronomy generally for the angular variation in the position of an object caused by the eccentric situation of the observer with respect to a certain point of reference. Thus the parallax of the moon, sun, planets, comets, is the difference between the position of any of these bodies as seen from the surface of the earth and that in which they would be seen if the observer were placed at the earth's centre. The parallax of the fixed stars is the difference between their places as seen from the earth and from the sun, which is for those observations the point of reference. All bodies within the solar system are in the first instance referred to the earth's centre; while those beyond our system, as the fixed stars, are referred to the centre of the sun, and the change arising from eccentric position in each case is called parallax.

From the effects of parallax we derive all our knowledge of the distance and magnitude of the bodies which are visible in the heavens.

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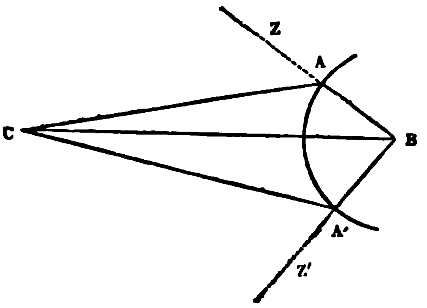
* [illegible] Ptolemy's [illegible] He seems to have [illegible] the moon's parallax [illegible] of the earth's radii. [illegible]



Let AB be any line the length of which is accurately measured, and let the angles CAB, CBA, be observed, then the distances CA and CB can be computed. In this way trigonometrical surveys are made, with the further precaution that the angle ACB is observed when this is possible, and C is to be fixed with great nicety. The angle ACB is known, since it $= 180° - (BAC + ABC)$, and we have $AB : BC :: \sin ACB : \sin CAB$. In the above figure let A be the position of a spectator on the earth's surface, B the centre of the earth, C the moon, and Z (in BA produced) the geocentric zenith. Then ZAC is the apparent geocentric zenith distance at A; ZBC the true geocentric zenith distance, *i.e.* that which would be seen from the centre of the earth; and $ACB = ZAC - ZBC$, the moon's parallax· also

$$\sin \text{parallax} = \frac{AB}{BC} \times \sin \text{Appt. geocent. zen. dist.}$$

When AC is at right angles to BA this sine = 1 and the moon is in the horizon. This value of the parallax is called the *horizontal* parallax; naming this P, and any other value of the parallax p, we have $\sin P = \frac{AB}{BC}$, and

$$\sin p = \sin P \times \sin \text{appt. geocent. zen. dist.}$$

It is evident that if P can be measured, the distance R of the moon's centre from the centre of the earth can be found, for the other quantity AB or r is the radius of the earth at the place of observation, which is known from terrestrial measurement. Now suppose a second spectator on the same meridian at A′, whose geocentric zenith is Z′, and that the two observers each observe the moon upon the meridian at the same moment: then, if z and z' be two observed geocentric zenith distances, and p and p' the parallaxes, $P = \frac{BA}{BC} = \frac{r}{R}$, $P' = \frac{BA'}{BC} = \frac{r'}{R}$, and

$$\angle ABC = z - p$$
$$\angle A'BC = z' - p',$$

and adding $ABA' = z + z' - (p + p')$, where ABA′ is the sum or difference of the geocentric latitudes of A and A′, and z and z', are known by observation; hence the value of $p + p'$ or ACA is found. From the equations

$$p + p' = z + z' - ABA'; \ \sin p = \frac{r}{R} \sin z; \sin p' = \frac{r'}{R} \sin z';$$

it is easy to find the value of R.

In practice, though the process is less simple, the principle remains the same. Two distant observatories can scarcely be found exactly on the same meridian, but the tables of the moon enable us to reduce the observation at one of the observatories to exactly *what it would have been* if it had been made under the meridian of the other. When the parallax is small, it is advisable to compare the planet by the *micrometer* with stars which are nearly in its parallel. When the parallax and consequently the distance for any given time is known, the distance and parallax for any other time can be found from theory. By observations of this kind, combining the observations of La Caille at the Cape of Good Hope with other observations made in Europe, the parallax of the moon and of Mars were fixed with great accuracy. Mr. Henderson has recently investigated the value of the moon's parallax from a comparison of his own observations at the Cape with those made at Greenwich and Cambridge. (*Mem. Ast. Soc.*, vol. x., p. 283.)

It will be seen that the point from which the moon's zenith distances are to be measured is in the prolongation of a line drawn from the centre of the earth, and not in the prolongation of a line in the direction of gravity, which is pointed out by a plumb-line. The correction which is to be applied to the astronomical zenith, in order to find the geocentric zenith, is given in many collections of tables for a certain hypothesis of the figure of the earth. The horizontal parallax given in the Nautical Almanac is that which belongs to the equator where the earth's radius is largest. A second table for reducing this equatorial horizontal parallax to the parallax proper to the place of observation (viz. log. rad., supposing the equatorial rad. = 1) always accompanies that above referred to.

Parallax of the Sun.—The first attempt to determine the sun's distance seems to be due to Aristarchus of Samos, and presupposes the knowledge of the moon's parallax. On drawing a figure, it will immediately be seen that when the moon has completed her first quarter (she is then said to be *dichotomized*, or cut exactly in two), the sun, moon, and spectator form a triangle, which is right angled at the moon. Now the angle which separates the sun from the moon can be observed at the same instant: suppose it = E, we have—

Distance earth & sun = distance earth & moon × sec. E.

The exact moment of *dichotomy* cannot be noted with much accuracy; yet repeated observations would show that the sun was far more distant than the moon. The antient astronomers seem to have estimated the sun's parallax to be from 2′ to 3′, which suffered a gradual reduction as the means of observation improved. The parallax of the sun might with modern instruments be measured in the same way as that of the moon or planets above described, but not so well, as a longer time must elapse between the passage of the sun and that of a star nearly in the same parallel. Ptolemy says that Hipparchus computed the moon's parallax from the phenomena of solar eclipses, that is, he deduced the value of the moon's parallax from the phenomena of solar eclipses on two suppositions of the sun's parallax, namely, that it was = 0, and again that it was a definite small quantity. As the circumstances of a solar eclipse vary from the effects of parallax, it is clear that in this way Hipparchus would get something like equations of condition involving the parallaxes of the sun and of the moon, which could be solved as soon as, by the problem of Aristarchus or by any other method, he could determine the relation between these two quantities.

We have thus shown that an approximate knowledge of the distances of the moon, sun, and planets, in terms of the magnitude of the earth, requires nothing more than observation and the solution of a triangle one side of which and the two including angles are known. The magnitudes of these bodies can be immediately calculated from their apparent diameters and true distance; so that up to this point there is no room for scepticism, if it be granted that the angles of a triangle equal two right angles.

There is a method of ascertaining the parallax by one observer. Let Mars in opposition be the object, and compare it in right ascension with a neighbouring star in the same parallel on the meridian, and also several hours before and again after his transit. The parallax, being wholly in a vertical circle, will not affect the right ascension in the meridian: hence the meridian comparison will give the true difference of right ascension between the planet and star. The other observations (after correcting the place of Mars by his hourly motion, which is known either from the tables or from observations on preceding and succeeding days) present right ascensions of the planet affected by parallax in different ways, and from these effects it is easy to compute the actual value of the horizontal parallax, and consequently the distance of the planet in terms of the earth's radius at the place. The star of comparison and the hour angle must be so selected that no error can arise from the uncertainty of refraction. Similar observations which have parallax may be made with the altitude and azimuth circle; but these observations do not admit of much nicety.

Kepler's discoveries,* that the planets move in ellipses round the sun in the focus, that the area swept by each radius vector in a given time is a constant quantity for the same planet, and lastly, that the squares of the periodic times are as the cubes of the mean distance, have supplied means for a much more accurate determination of the sun's parallax. Assuming these laws, the *forms* of the orbits of the earth and planets and their *relative* distances can be determined from observation; hence, if the parallax of any one planet can be found, the parallaxes of the sun and of the other planets can be computed. Observations of Mars be [illegible], at his observations made at the Cape of Good Hope and at Greenwich, will afford a very tolerable value of his parallax and hence of his distance. Again as the proportion between the distances of Mars and the earth from the sun at any time is known from the form of their orbits and their periodic times, and the angle between the sun and Mars at the earth can be observed, the triangle between the sun, earth, and Mars can be completely solved, and hence the distance of the sun and his parallax be computed. These observations can be repeated at every opposition of Mars, and if Mars be compared by the micrometer with stars near the same parallel, there is scarcely a limit to the possible accuracy of the observations. In the *Naut. Alm.*, 1839, pp. 461-5?, there is a list of the stars with which Mars is to be daily compared at its opposition in that year. (*Mem. Ast. Soc.*, vol. ii., p. 27, and vol. vi., 297, &c.)

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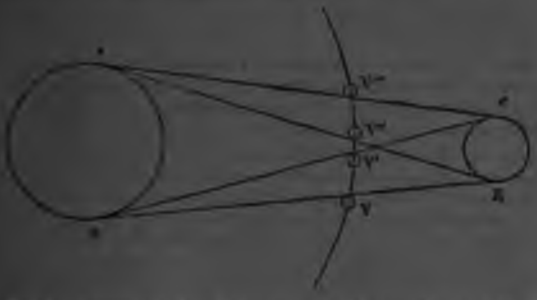
* Though these discoveries are due to Kepler, the satisfactory proof of their truth was given by Newton.

The observation however by which the parallax of the sun is determined with the greatest certainty, is that of the passage of Venus over the sun's disc, commonly called the *transit of Venus*. [Transit of Venus.]



In the figure let Ss be the sun, Ee the earth, and V and V′ two positions of Venus, which is supposed to be moving in the direction V V′. To make the figure simple, we suppose the earth to be at rest, and that V V′ represents the excess of the angular motion of Venus above that of the earth. A spectator at E will see the commencement of the transit when Venus is at V, but a spectator at *e* will only begin to see it when Venus is at V′. The time which must elapse between these two moments is equal to the time in which Venus passes from V to V′, or in which she describes the angle ES*e* round the sun with her *relative* angular motion. But the angle ES*e* is twice the sun's horizontal parallax; hence, since the time elapsed between the ingress at the two places is known from observation and from the difference of longitudes, and the hourly angular motions of Venus and the earth round the sun are known from the tables, and consequently the difference of these motions, the horizontal parallax of the sun can be found. It is evident that as the ingress is accelerated at E and retarded at *e*, so the egress will be accelerated at E and retarded at *e*, Venus then occupying the positions V″, V‴.

Let us suppose further that a spectator who saw the ingress at E, and therefore as early as possible, should by the rotation of the earth be carried to *e*, where he would see the egress as late as possible, while the spectator of the late ingress at *e* is in like manner carried to E, where he sees the earliest egress.* In the first case the time of the transit is increased as much as possible by the effect of parallax, and in the latter case it is equally diminished. Now suppose the parallax of the sun to have a certain value, the parallax of Venus and the effect of these parallaxes in increasing or diminish the duration of the transit for any specified places of observation can be computed. Hence when the durations are really observed, the differences between the observed duration and that which would have been observed if the spectator had been placed at the centre of the earth will fix the actual amount of the parallax. The especial excellence of this method consists in the accuracy† with which a particular phenomenon can be observed, namely, the first streak of light which is seen after the interior contact at ingress and the last streak before the interior contact at egress. Two points on the earth are chosen where the beginning and end are both visible, in one of which the duration is shortened as much as possible, while it is increased in the other. Every observation of either ingress or egress can in fact be used for determining the parallax, provided the longitude of the place of observation and the time be sufficiently well known; but where both the ingress and egress are observed, the duration alone requires care. Transits of Venus were observed in 1761 and 1769, and the parallax of the sun deduced by various computers. (Lagrange, *Mémoires de Berlin*, 1766; Encke, *Der Venus Durchgang*, Gotha, 1824.) The next transits will take place in 1874 and 1882.

In the preceding part of this article the methods of determining the parallaxes, and consequently the distances of the bodies composing our system, have been described, and we will now point out the way in which this knowledge is applied. Every observation of the sun, moon, or planets is affected by parallax and must be corrected for this previous to further calculation. All celestial bodies are apparently elevated by the refraction of the atmosphere, and those of our system are depressed by the effect of parallax. In nautical works there are tables for reducing the observed altitude of any heavenly body to its true altitude, *i.e.* to that which it would have if there were no atmosphere and the spectator were at the earth's centre. In most of the problems from which the longitude is determined astronomically, in solar eclipses, occultations, and lunar distances the great difficulty and trouble is in computing the effect produced by the moon's parallax. Astronomers have invented convenient *formulæ* for this purpose, according to the planes to which the bodies are referred. Thus in working out an occultation, the moon may be referred to the plane of the *horizon*, when the effects of parallax in altitude, and, if great accuracy be required, in azimuth, must be computed; or again, to the *equinoctial*, when the parallax in right ascension and declination is to be calculated; or finally, to the *ecliptic*, when the parallaxes in longitude and latitude must be found. The rules for these computations are given in treatises on Astronomy.

The mean equatorial horizontal parallax of the sun, according to Encke, = 8″.5776. Its true value for every ten days is given in the *Naut. Alman.* at the end of the ephemeris of the sun and moon. The equatorial horizontal parallax of the moon for mean noon and midnight is at page III. of each month, and the parallaxes of the planets are in the last column of the planetary meridian ephemeris.

One effect of parallax is, that the moon appears under a larger angle when near the zenith than when near the horizon. This is contrary to common opinion, but may be very easily proved experimentally, by any one who can handle a sextant with ordinary care. When the moon is in the zenith, the horizontal diameter may be *augmented from* 30″ to 40″. There is a table for this augmentation of the moon's semidiameter in most nautical works.

Constant of Parallax (*la constante de la parallaxe*) is the angle under which the earth's radius would be seen at the centre of the moon when she is at her mean distance. The radius chosen by La Place is that which belongs to a latitude of which the square of the sine = ⅓.

PARALLAX OF THE FIXED STARS. When Copernicus proposed his hypothesis of the earth's motion, one striking *astronomical* objection was, that the enormous displacement of the spectator's place which his system supposed was not supported by a corresponding change in the positions of the fixed stars. Every improvement in instruments, in the art of observing, or in the science of computation, seemed to increase the distance of the sun, and consequently the orbit of the earth, and still no sidereal change could be detected. Hence, until the discoveries of Newton brought forward physical arguments, of which however the conclusiveness is not immediately visible, the Copernican hypothesis was embraced on the grounds of its symmetry and simplicity rather than on demonstration. Opponents might always ask for the *experimentum crucis*, the effects of the earth's motion in the apparent displacement of the fixed stars, and this could not be supplied.

Many attempts were however made. Hooke erected a zenith sector at his chambers in Gresham College, and made some incomplete observations in which he fancied he could trace the effects of parallax. Flamsteed found variations in the north polar distances of fixed stars, which he attributed to parallax, although, as was shown by Cassini and Roemer, this would have produced results with a totally different law. Roemer himself, after many efforts to deduce parallax from observations in declination, renounced the attempt, on account, as he says, of 'a certain variation in the declinations of stars which can neither be attributed to refractions nor parallaxes,' and pursued his investigation by observations in right ascension, in which it seems he believed himself to be successful. At length Bradley commenced the research with far better astronomical means, and by his discoveries of aberration and nutation, fully explained the phenomena which had perplexed his predecessors. It is curious that Roemer, who had discovered the gradual transmission and finite velocity of light, should have been perplexed with the necessary results of this very property in another shape; and that Bradley, while pursuing the problem of parallax, which had been originally interesting as a proof of the earth's *change of place*, should have hit upon phenomena which satisfactorily proved the earth's *motion*, and so confirmed the Copernican hypothesis by evidence different from what he sought. Bradley's observations further showed that the effect of parallax in any of the stars observed by him could not amount to 2″ and probably was not 1″.

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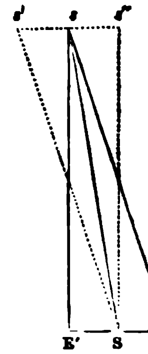
* The explanation is only intended to exhibit the principle on which this very important problem depends.

† This observation seems not to have been quite so delicate as was expected, a little uncertainty was introduced at the moment of interior contact before the formation of the thread of light, a sort of black drop (goutte noire). Mr. [illegible] has noticed [illegible] threads connecting the edges of the sun and moon [illegible] the formation and breaking up of the threads in the eclipse of May 15, 1836 (*Mem. Ast. Soc.*, vol. x. p. [illegible]), which seems to be a phenomenon of the same kind.

The nature of the changes in the places in the fixed stars, which the change of position in the earth would produce, may be seen from the following figure. Let S be the place of the sun, E that of the earth, and *s* that of a fixed star. Then the star is seen from the earth in the direction E*s*, and from the sun in the direction S*s*; the difference in these two directions is the angle E*s*S, that is, the angle of parallax. If S*s*′, *ss*′, be drawn parallel to E*s*, ES, and the observations made from the earth be referred, as observations of this kind are always supposed to be, to the sun, the true place of the star is at *s*, while the place which is assigned to it by observation is *s*′. At the end of half a year the place of the earth will be at E′, and the star is seen in the direction E′*s*. Hence it is referred to the position *s*″ in respect of S. It is evident that the effect of parallax is to cause the star to appear to describe an orbit round its true place in a plane parallel to the ecliptic, similar and equal to the earth's orbit round the sun; and further, that parallax is always in a plane passing through the star, sun, and earth, and that its effect is to diminish the angle which the sun and star subtend at the earth. When this is clearly conceived, it will also be seen that this ellipse, which is similar to the earth's orbit, will be seen obliquely from the earth, and consequently be projected into another ellipse with altered proportions. The same figure would serve for an explanation of aberration, except that aberration is in a plane defined by the star and the *direction* of the earth's motion, which direction is at right angles to the line joining the earth and sun, so that the *phenomena* of parallax and aberration are similar, only the effect of parallax is at right angles to the effect of aberration. This affords a convenient mode of computing the coefficient of parallax when that of aberration is known.*



There is another view of parallax. Suppose a spectator at the star *s*; then he would see the earth's radius vector SE under the angle of parallax. The earth's orbit may be considered to be circular, and as the plane is inclined to a spectator anywhere except in the pole of the ecliptic, the earth will appear to describe an ellipse about S as centre. The nearer the star *s* is to the ecliptic, the more excentric this ellipse will be,* but in all cases there is a diameter of the earth's orbit, viz. that which is perpendicular to the line joining S*s*, which is seen in its true proportions without foreshortening.

Since Roemer and Bradley, many astronomers have sought for parallax by observation in right ascension and declination. Bessel could find no evidence of such an effect in Bradley's transit or zenith distance observations. Piazzi, from meridian zenith observations, concluded that Sirius had a parallax of 4″ and Procyon one of 5″·7; Calandrelli found a parallax of 4″.4 in *α* Lyræ. But the most persevering and accurate observations for deducing the value of parallax from meridian observations were, not long since, prosecuted by Dr. Brinkley at Dublin with an 8-foot circle by Ramsden, and by Mr. Pond at Greenwich with the 6-foot mural-circle of Troughton. Dr. Brinkley conceived that he had established without doubt a sensible parallax in *α* Lyræ, *α* Cygni, and *α* Aquilæ, while Mr. Pond maintained that no sensible parallax was shown in any of those stars, from observations in declination and in right ascension. He further corroborated this result by comparing two stars, *α* Cygni and *β* Aurigæ, which have nearly the same declination and opposite right ascension, with a fixed tube. This controversy continued for several years, and though there can be no doubt *now* that Dr. Brinkley was mistaken, and that Mr. Pond was right in his conclusions, there is a good deal of interest attached to the discussion. Dr. Brinkley's last memoir is in the *Transactions of the Royal Irish Academy*, vol. xiv. Mr. Pond's paper on the parallax of *α* Lyræ will be found in the *Phil. Trans.*, 1823, part i., p. 53. A series of most excellent observations of *α* Lyræ were made at Greenwich in 1836, for the express purpose of ascertaining its parallax. After a careful discussion, Mr. Airy concludes that the annual parallax of *α* Lyræ, though undoubtedly existing in a quantity theoretically measurable, is too small to be made sensible to our most accurate meridian instruments. (*Mem. Ast. Society*, vol. x., p. 239.) Very careful transit observations by Bessel and Struve have shown that the parallaxes of all the stars they have examined in this way are so small as to leave the existence of any sensible parallax exceedingly doubtful. The only star in which parallax seems to be shown with great probability by meridian observation is the double star *α* Centauri. (*Mem. Ast. Soc.*, vol. xi., p. 61.) It may perhaps be sensible in Sirius, but the quantity is too small to be satisfactorily ascertained by such instruments. There are so many causes of error, and the whole quantity sought for is so minute, that we can scarcely expect a decided value of parallax to be shown by meridian observation. It is pretty certain that the diameter of the earth's orbit does not subtend a larger angle than 1″, at any of the stars hitherto examined, except *α* Centauri (it may be less in any proportion); so that the distance of these stars is at least 400,000 times the distance of the sun from the earth.

Sir William Herschel first pointed out the mode of detecting parallax which affords a probability of success, viz. that which depends upon the measurement of double stars. In his paper, *Phil Trans.*, 1782, part i., p. 82, he showed that if the stars which compose a double star be at different distances from the earth, which was at that time supposed to be the chief cause of differences in magnitude, they must be differently affected by parallax, and therefore that their apparent distance from each other will be altered by a change of position in the spectator. Now as the apparent distance of two neighbouring stars can be measured with great accuracy,† the problem of parallax is thus reduced to that of finding a double star in which a variation of distance is observable, and following the law which the earth's change of place requires. It was in this inquiry that Sir William Herschel discovered that very many double stars have a relative motion both in distance and angular position, which proves them to be a connected system, and that unexpected result, which he prosecuted with all his ardour and genius, seems to have led him from the investigation of parallax into his profound and original researches. Sir John Herschel (*Phil. Trans.*, 1826, part iii., p. 266) extended his father's proposal for the discovery of parallax by show-that the variation produced by parallax in the angle of position of two stars is a more sensible phenomenon and one more easily measured than the variation in distance; and in the *Phil. Trans.*, 1827, p. 126, he published a considerable list of stars suitable for this research, with the times of year when the observations would show the greatest effect of parallax.

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* This similarity between aberration and parallax is not rigorous, but nearly so. It would be strictly true if the earth moved uniformly in a circle. There are convenient tables for computing aberration for a given constant of aberration. Calculate the aberration by these tables for ☉ + 90°, ☉ being the sun's longitude at the time, divide by the seconds of the constant of aberration, and you have the coefficient of parallax, the parallax being supposed = 1″. Also the times when the parallax in right ascension or declination is the greatest possible will be when the effect of aberration in those directions is 0, and versa vice.

* The semi axis major is the earth's radius vector, and the semi axis minor is the earth's radius vector × sin of *s*'s latitude.

† It is perhaps more easy to determine the distance of a double star to a ·1 than to fix an absolute place to 1″.0.

It has been shown that the earth's change of place in its orbit causes each star to have an apparent motion in an ellipse of which the major axis is parallel to the ecliptic and equal to the diameter of the earth's orbit as seen at the distance of the star, and the minor axis equal to the major × sine ☆'s latitude. If then the stars be a connected system, and comparatively near each other, the stars will appear to describe two equal and similar ellipses, and the line joining their apparent places will be equal and parallel to the line joining their *true* positions. It is therefore in vain to look for any effect of parallax in micrometrical or relative measures of distance and position in a connected system. But if one of the stars be much farther from us than the other, suppose it ten times farther off, then the apparent ellipses will continue to be similar, and similarly described, only the dimensions of that described by the more distant star will be 1-10th of that star described by the nearer, which comes to the same thing as supposing the more distant star to be fixed, and the nearer star to describe round its true place an ellipse of 9-10ths the actual dimensions. If with Sir William Herschel we measure the apparent *distances* of the two stars, those are best suited to the purpose in which the line joining the stars is in the direction of the major axis of the parallactic ellipse, *i.e.* is parallel to the ecliptic. If we proceed by measures of position, as recommended by Sir John Herschel, those stars are most favourable in which the line joining the two stars is perpendicular to the ecliptic. It is scarcely necessary to say that these conditions are not rigorous, and that stars tolerably near the pole of the ecliptic are equally well suited to either kind of measure, as the apparent ellipse is then almost a circle. Since the application of clock-work to large equatorials, we think that the measures of distance of double stars may be made nearly as accurately, and even more easily, than angles of position; and further, that any telescopes which have yet been constructed may be mounted equatorially and carried by clock-work. Most of the close double stars are probably connected, and are therefore unfit for the detection of parallax. Again, when the distance exceeds a few seconds, measures with the wire micrometer and with high powers are not satisfactory, for the eye in delicate measurement must see both stars at the same glance. The number of stars apparently double in which parallax is likely to be found, and so close as to admit of accurate measurement with the wire micrometer, is probably very small: happily there is another instrument of equal accuracy with the wire micrometer, and of wider grasp, which can be applied to this research, the heliometer. [MICROMETER.] The heliometer will measure thousands of minutes as easily as the wire micrometer can measure seconds.

In the last named property, that of measuring considerable angles, the heliometer is unrivalled, and thus we see its special use in the researches connected with parallax. It is almost hopeless to attack the problem by any other means at present known; and the divided eyepiece, which is found very useful for *small* measures of distance, is, like the wire micrometer, *limited* in this respect.

For his researches on parallax, Bessel selected the remarkable star 61 Cygni, which is a double star having a large proper motion. This property leads us naturally to guess that it is a comparatively near star, as its actual velocity would otherwise be enormously large. Two stars *a* and *b* were chosen, *b* in the direction joining the component stars of 61 Cygni, and *a* at right angles to this direction. The observations of *b* are made by bringing it into the middle of the two stars, those of *a* by placing it in the same line with the two stars. As the two stars of 61 Cygni are nearly of the same brightness, the observation is exceedingly accurate. These measurements were continued for fourteen months with very little interruption. The stars *a* and *b* are so far removed from 61 Cygni as to render any connexion with it improbable. Variations were found in these distances, which, being compared with the effect which parallax would produce, are *exactly* accounted for; therefore this variation is produced by parallax, for it can be shown that any other *known* cause of disturbance has been got rid of by the skill of the observer. The result is that the parallax of 61 Cygni is 0″·314; whence the distance of 61 Cygni is 656,970 times the distance of the earth from the sun, and light from the star is 10¼ years in reaching us. Though subsequent observations may modify this result, there is no probability that it will undergo any considerable alteration. (*Astron. Nachrichten*, N. 365, 6.) There is a second memoir not yet published. For Struve's inquiry into the subject of parallax, see his splendid work *Stellarum Duplicium et Multiplicium Mensuræ Micrometricæ, &c., annis à 1824 ad 1837 institutæ*, p. clxix, where he enters very fully into this subject.

PARALLAX, ANNUAL, is the angle under which the earth's orbit is seen by a superior planet.

PARALLAX, in practical optics, is the longitudinal misplacement of the wires in a telescope or microscope. If the wires are not at a proper distance from the object-glass, the image of the object is not seen distinctly when the wires are so seen. On giving a little motion to the eye, the object will seem to move upon the wires. If it moves in the direction of the eye, the cell carrying the wires must be pushed in, and *vice versâ*. There are means for this adjustment in all instruments which require it, and it is a point to which the attention of observers should be very carefully directed.

PARALLEL ROADS OF GLEN ROY. Glen Roy and several other valleys of the Highlands of Scotland exhibit very distinctly a series of parallel and nearly horizontal lines, embracing the sides of the hills and entering many of the lateral glens, at levels from a few to several hundred feet above the general bed of the valley. The important evidence which these elevated terrace-lines bring to the solution of questions regarding the origin of valleys, the dispersion of alluvial and diluvial detritus, and the subsidence or elevation of large tracts of land, induces us to present a critical examination of the state and progress of geological investigation on the subject. We have seen and examined Glen Roy; but the principal information in the following notice is gained from Dr. MacCulloch, Sir T. Lauder Dick, and Mr. C. Darwin.

Glen Roy is a valley in the district of Lochaber, whose headwaters gather on a wild mountain tract near the source of the Spey. The water of Roy runs nearly south, and joins the Spean, which turns westward to enter the 'great valley' of Scotland, below the south-western extremity of Loch Lochy. Passing from Fort William to the foot of Glen Roy, we have porphyry, gneiss, mica schist, primary limestone, and quartz rock, much disguised by diluvial accumulations. Glen Roy divides, not indeed exactly, the mica schist and gneiss systems, the former predominating on the western and the latter on the eastern side. About the source of the Spey is a limited tract of granite; and the low summit of drainage between Glen Roy and Glen Spey is formed of this rock. From this flat and boggy summit the descent is gradual to Loch Spey on the east, and sudden into Glen Roy on the west. Upper Glen Roy, as MacCulloch terms the part near the head, is an oval valley, about four miles in length and one or more in breadth, and bounded on two opposite sides by high mountains, yielding two streams from the north-west and south-east, which meet near the middle of the valley. From their junction the united water of Roy flows in a gradual manner to the south-west for about two miles, when the valley contracts to a low rocky pass, in which the river runs a troubled course, and then emerges into the wide and long and rather sinuous valley of Lower Glen Roy. At the extremity of the rocky gorge which separates the upper from the lower glen, MacCulloch directs attention to a remarkably flat rock; and observes that above this gorge, in Upper Glen Roy, no distinct *terrace* or *shelf* was seen, but a *line* was noticed extending from near the junction of the streams which form the Roy towards Loch Spey; and it was proved by the spirit-level that this *line* was level with the remarkable flat rock at the gorge which terminates Upper Glen Roy, and also with the uppermost of three such lines, terraces, or shelves in Lower Glen Roy. (Both Sir T. Lauder Dick and Mr. Darwin represent this upper *line* as being traceable all round Upper Glen Roy to near the edge of Loch Spey.) Passing from Upper to Lower Glen Roy, the single line of Upper Glen Roy ascends from the valley and girdles the sides of the hills right and left, with seemingly higher and higher sweeps, and is followed by two other perfectly parallel and equally continuous lower lines, till Glen Roy expands into Glen Spean. Here the *two upper lines end;* but the lower one appears on the north and south sides of Glen Spean as far towards the source of the river Spean as the singular pass of Muckul, and turns southward a little way up the Gulban river, and still farther along the sides and round the head of Loch Treig. In a westward direction this line continues down Glen Spean on both sides, about half the distance from the Roy to the Lochy, and then ceases; nor has it been noticed in the Great Valley between Fort William and Inverness. Another line however, a few feet higher than the highest in Glen Roy, appears in the upper parts of Glen Gluoy, which, running parallel to Glen Roy, enters Loch Lochy. Mr. Darwin notices a *line* in another smaller tributary to Loch Lochy, near Kilfinnin; and describes a short terrace which appears on the south side of Loch Spey, about sixty feet above that lake, and higher than the highest terrace of Glen Roy. Sir D. Brewster has also observed shelves resembling those of Glen Roy in a part of the valley of the Spey, several miles below its source.

The elevation of these lines above the sea is known approximately, but not with the exactness demanded by a phenomenon so curious in itself and so fertile of subjects for geological speculation. In the following table we have combined the statements of MacCulloch, Sir T. Lauder Dick, and Mr. Darwin. The last writer thinks Dr. MacCulloch's measures of the terraces in Glen Roy 100 feet in excess.

Relative levels of the various lines in Scotland:—

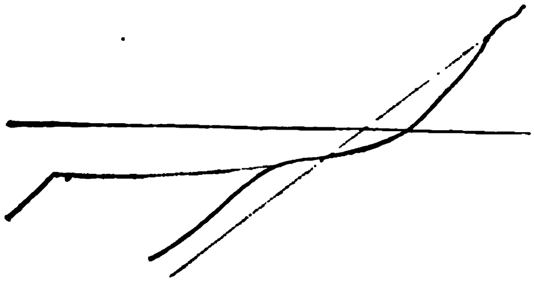
	Darwin.	Dick.	MacCulloch.
South of Loch Spey*	..	..	..
Kilfinnin . . .	1202	..	1302†
Glen Gluoy. . .	..	292	1274
Upper Terrace, Glen Roy	1162	280	1262
Middle Terrace, Glen Roy	..	200	1182
Lower Terrace, Glen Roy	..	0	972
Loch Lochy . .	82	..	..
The sea at Loch Eil .	0	..	0

The *lines*, *shelves*, or *terraces* (for each of these names is locally appropriate) must not be confounded with the more ordinary occurrences of short successive level terraces of gravel, or with the *longer* declining gravel banks which margin the sides of many valleys where they pass from the mountains to plain countries or the sea; they should be distinguished also from the similar little terrace heaps which often appear at the summits of drainage in mountain countries. Such gravel terraces are seen both at the summit and at the foot of Glen Roy, and in each case appear intelligible as the result of fluviatile action at higher levels than the present water-channel.

The *lines* of Glen Roy and the other valleys are not short protruding terraces connected with the several lateral affluents, nor declining planes of gravel, but almost perfectly continuous shelves, sloping toward the valley from a level line, and almost perfectly parallel through all the various windings of their linear extent, and round the hollows and projections of the hills, whether these are small or great, sudden or otherwise; and each respective range, on one side of the glens, is exactly on the same level with that corresponding to it on the other side. This almost perfect horizontality and continuity of range is the grand feature of the phenomenon, and though easily admitted on ocular inspection, it is satisfactory to know that Sir T. L. Dick has *proved* it by careful levelling with Mr. Maclean on each of the 'shelves' in Glen Roy. With such characters it is not wonderful that these mysterious works of nature should be supposed the effect of art, and the term of 'Parallel Roads' is far from inapt, and is certainly very descriptive.

The 'shelves' generally appear distinctly and even sharply defined when viewed from below or from a distance; but when inspected more narrowly, they appear very indistinct, and one may actually be treading on a shelf without being aware of it. This arises in a great measure from the fact that the surface of the shelves is far from level, but being often a little concave above and a little convex below, easily on a near view loses itself in the general slope of the mountain.

Sir T. Lauder Dick represents the general figure of a section of the shelf thus:—



Dr. MacCulloch gives many representations on a small scale, which show the really sloping character of the shelf or terrace, the angle of declination from the horizon varying from 12° to 30°, while the breadth of the terrace part varies from 10 to 70 feet; where the slopes of the 'lines' are steepest their surface is narrowest, and generally where the ground slopes the least the terraces are the broadest. A real profile of one part is given below by the black line.

According to Mr. Darwin's view of the relation between the actual form and the original outline of the fundamental rock, one part will appear to be formed by *excavation* of the rock, and another part by accumulation of detritus, very slightly projecting beyond the slope of the mountain. MacCulloch's drawings indeed represent the shelves as hardly in any case projecting into a mound. Another part is drawn to represent a valley terrace composed of gravel, to which the shelves (where they cross valleys) occasionally unite on a level, and thus form broad expansions.

'The shelves entirely disappear when crossing any part of the mountains in which the bare rock is exposed; for loose matter cannot accumulate there, and the rocks themselves, from their laminated structure, do not readily become worn into any regular form. They likewise disappear when crossing any part which is greatly inclined; for their own slope then coincides with that of the alluvial covering, and cannot be distinguished from it.' (Darwin.)

The actual surface of the shelves is very irregular; they are composed of the same kind of alluvium with that covering the whole surface of the mountain. (Darwin.) They commonly contain rounded pebbles, and are in many places covered with large masses of stone, some of them many tons in weight, lying for the most part quite detached on the surface, and having their acuter angles rounded off in the greater number of instances; in short, *in every respect resembling those fragments generally found strewed on the margin and on the shallow edge of alpine lakes.* In some places, where the stones are large and the shelf narrow, a single block covers its whole breadth. When rock appears anywhere on a shelf, its angles are also rounded. (Sir T. L. Dick, from whom the above description is taken, states that the soil above the highest line of shelf is materially different from that below, which has more gravel, pebbles, and alluvial clay; but Mr. Darwin's subsequent observations do not confirm this.) The cases are few in which the solid rocks are much worn away in this manner; indeed they are not visible on the shelves. Some of the blocks of stone on the shelves have fallen from the heights above; others belong to far removed sites, and are in fact *erratic boulders*. Among these latter are large granite blocks.

It must be evident, from the foregoing description, that the parallel roads of Glen Roy, and the lines resembling them or connected with them in the neighbouring regions, are marks of the antient level of water filling the valleys to their summits or nearly so, and extending towards their mouths till within a few miles of the sea, or the great interior valley of Scotland. As many *lines* as we see, so many successive effects are there of water oscillating about particular levels through all the extent of the lines. This is freely admitted by all writers and all observers on the subject. Sir T. L. Dick, who gives abundance of illustrations of similar shelves being actually formed on the steep sides of modern lakes, adopts the hypothesis which most easily and obviously suggests itself, and ascribes the lines in all the valleys to the operations of a lake whose waters were successively lowered. Dr. MacCulloch discusses very ably two other modes of watery action whereby the lines may be supposed to have been formed; first, by a sort of local deluge filling the valley; secondly, by the excavating power of water in a valley previously filled by alluvial sediments to a particular height; and shows each hypothesis to be unsuitable and untenable.

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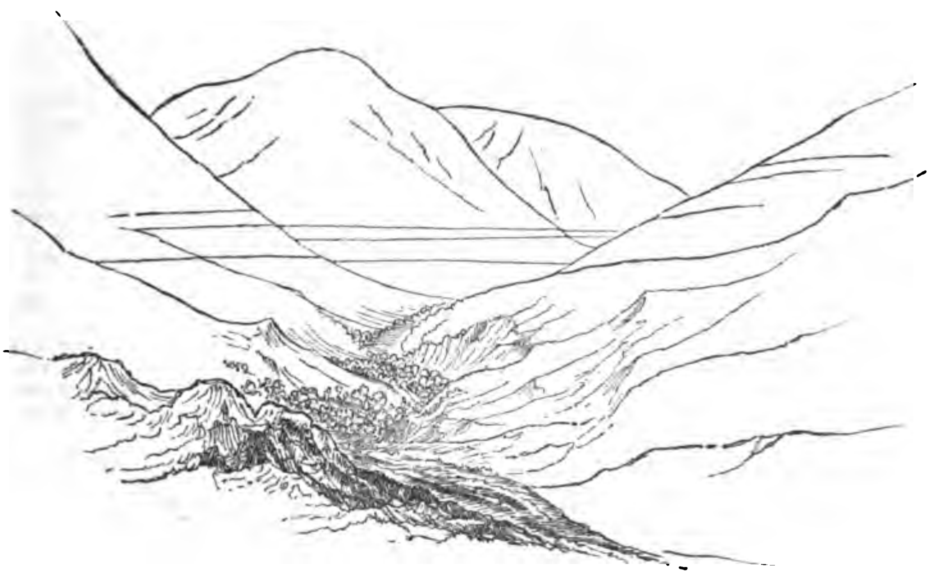
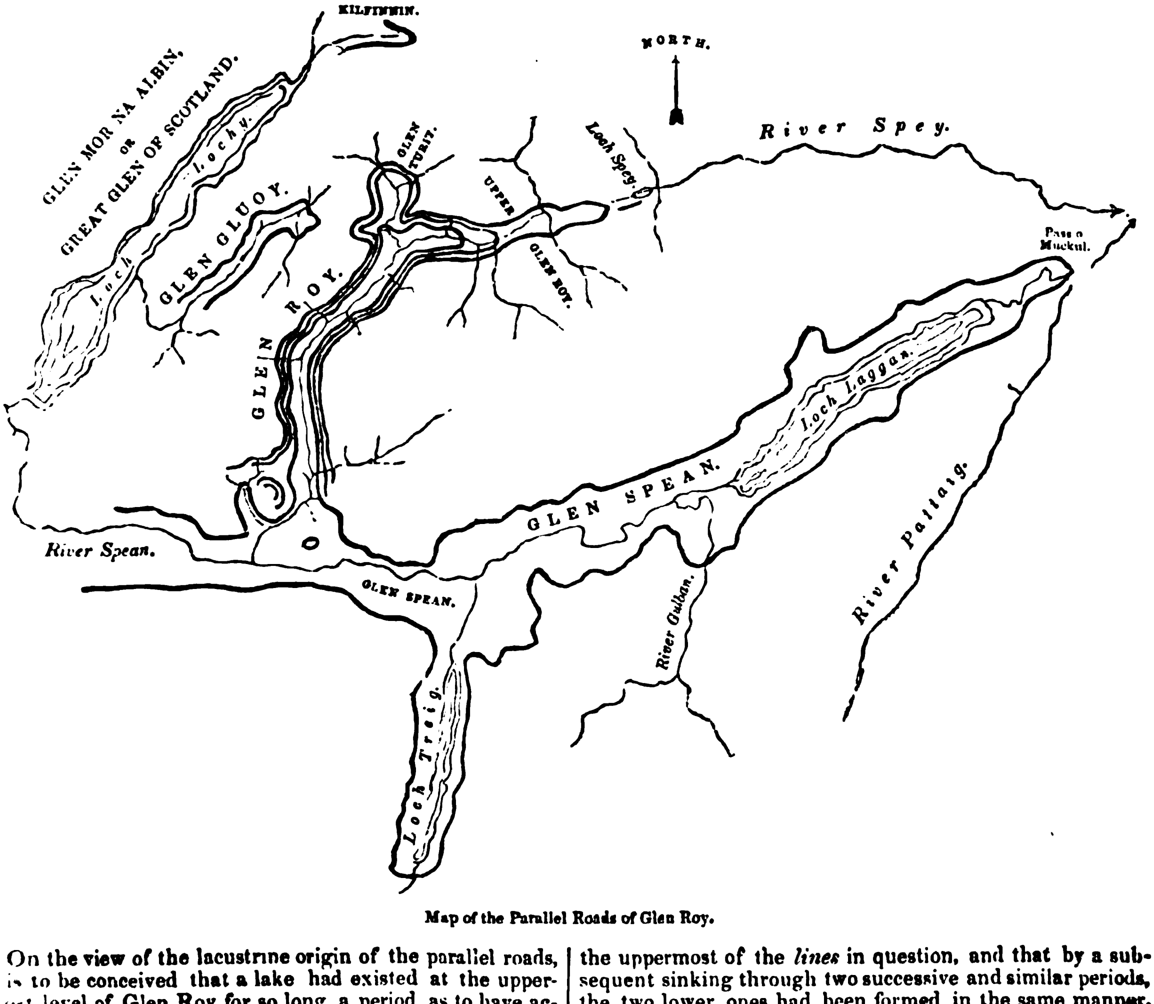
* Mr Darwin says this is 60 feet above Loch Spey, but he does not state the height of the upper terrace of Glen Roy above that loch. MacCulloch supposes it to be the continuation of the upper level of Glen Roy. He says Loch Spey is 1203 feet above the German Ocean, and that the upper line in Glen Roy is 6[illegible] feet above Loch Spey.

† This number is supplied by adding the partial results of Darwin to MacCulloch's general scale.



View of the Parallel Roads of Glen Roy. Sketched from nature, in 1826, by Professor Phillips.



Map of the Parallel Roads of Glen Roy.

On the view of the lacustrine origin of the parallel roads, it is to be conceived that a lake had existed at the uppermost level of Glen Roy for so long a period as to have accumulated on its margin that alluvium which now forms the uppermost of the *lines* in question, and that by a subsequent sinking through two successive and similar periods, the two lower ones had been formed in the same manner. (MacCulloch.)

Connecting the whole subject in one view, Sir T. Lauder Dick supposes that Glen Gluoy was antiently filled with a lake discharging itself by a short stream into Glen Roy, which, at the time of the formation of its upper shelf, was filled by a lake level with the summit of the drainage of the Spey, into which its superfluous water ran, and extending thence to the sides of Glen Spean (then filled with water), but separated from that glen by a barrier afterwards in part removed. By such partial removal, the level of water in Glen Roy sunk 80 feet, and still the lake in Glen Roy was distinct from that in Glen Spean. Finally, by a further removal of the barrier, the level of Loch Roy, as we may term it, was lowered 200 feet more, to that of Loch Spean. As in this view Glen Gluoy and Glen Roy are supposed to have discharged their waters in the direction where now are the heads of the lakes, so Loch Spean is supposed to have done this by the pass of Muckul, eastward to the Spey, and not westward to Loch Linnhe. By a subsidence at the former head of Loch Roy, its waters no longer flowed to Glen Spey, but to Glen Spean; by a similar subsidence at the former head of Loch Gluoy, its waters were turned to Loch Lochy; and by a similar effect at the former head of Loch Spean, its waters turned from the Spey to the westward.

We may further imagine, at what is now the lower end of Glen Roy, either a great subsidence of the land, or a wearing away of a narrow and weak barrier left between it and Loch Spean; the latter is the hypothesis of Sir T. Lauder Dick.

If now it be supposed that, parallel to the then upper (western) ends of Glen Spean and Glen Gluoy, a general subsidence happened, the entire change of the current of water from its former to its actual state, from an eastward to a westward direction, and the entire drainage of these supposed lochs, follows of course.

Sir T. Lauder Dick ascribes this effect to a grand system of displacement of the crust of the globe, whereby the Great Glen of Scotland was produced; that glen is a symmetrical axis of displacement, of which we can hardly know the true geological date, but it is clear that so remarkable a feature in the geology and geography of Scotland as this Great Glen cannot be neglected in speculations on the antient lakes of Lochaber, and Sir T. L. Dick's hypothesis acquires no little plausibility from the use he has made of this great line of subterranean movement. Dr. MacCulloch, instead of these originally separate lakes, of which he cannot see the probable barriers, supposes one continuous lake in the valleys of the Roy, the Spean, the Gluoy, and the Lochy, and imagines barriers on the way to the sea, in the valleys of the Spey and the Lochy, and on the line of the Great Glen.

Struck with the difficulties under which both these hypotheses labour, in regard to the antient existence and removal of barriers in such improbable situations, Mr. C. Darwin has proposed a new view of the case, in conformity with the opinion of Mr. Lyell (*Princip. of Geology*, book iv., chap. 10), regarding the parallel roads of Coquimbo in Chili, described by Captain Hall. Mr. Lyell's speculation on the phenomena of Coquimbo is, that 'the three parallel roads were formed by the waves of the Pacific, and not by the waters of a lake; in other words, they bear testimony to the successive rise of the land, not to the repeated fall of the waters of the lake.'

From a series of appearances below the lowest shelf of Glen Roy, continued into Glen Spean,—such as the nature and distribution of detritus, the form and position of many short terraces, some related to the shelf or antient beach, others unconnected with the actions of the streams now running—Mr. Darwin concludes, apparently with reason, that every appearance in the sides of Glen Roy and Glen Spean, *below the lowest shelf*, will be explained on the supposition of a gradually subsiding sheet of water which received detritus from lateral streamlets. By observations of accumulated sand and pebbles in other valleys, as the sides of Loch Ness, Loch Dochart, &c., Mr. Darwin endeavours to extend this inference to a large portion of the Highland valleys, where no horizontal shelves make it a matter of certainty. Having rejected the hypotheses of separate and connected fresh-water lakes, on account of the difficulties attending them, which even in a single case are great (but if extended to many of the Highland valleys, insurmountable) Mr. Darwin adopts the alternative, that it was the sea in the form of narrow arms or lochs, such as those now deeply penetrating the western coast, which once entered and gradually retired from these several valleys.

That there has been a change of level between the land and sea in Scotland, to the extent of several hundred feet, is proved by Mr. Smith's and Mr. Prestrich's observations at Banff and near Glasgow and other places; and, thus fortified, Mr. Darwin traces in hypothesis the effect of an elevation of the land equably or by intermitting effects, showing that by this means the main phenomena of the Lochaber valleys would certainly be occasioned.

Objections to this speculation easily arise.—Why, for example, are shelves, the marks of intermission in the elevating forces which affected a large area with extraordinary equality, confined to a few valleys? Why, after encircling in complete belts the upper ends of the valleys, do they cease toward the outlets? Why has Glen Roy three shelves, and the neighbouring Glen Gluoy but one, and that at a different level from any in Glen Roy? Why, if the sea for *so long a time* laved the mountain sides, are no marine shells found except at comparatively small elevations?

Mr. Darwin answers to these objections: 1, that the conservation and even the original formation of *beaches* (for such the shelves certainly are) might rather be the exception than the rule, requiring particular slopes, loose materials, and freedom from erosive currents; 2, that the difference of level between the Glen Gluoy shelf and the highest in Glen Roy may be explained as an effect of unequal tidal oscillation; 3, that instances of the absence of marine shells from the upper parts of marine deposits occur in Sweden, Scotland, and elsewhere.

Such are the speculations to which the parallel roads of Glen Roy have given rise. The progress of modern geology has revealed so many proofs of the instability of the level of land and sea, and so many examples in which this change of level has been occasioned by a real displacement of land, that it is probable Mr. Darwin's explanations, drawn from the most general consideration, will be preferred to those which are more obviously suggested by the features of any one of the terraced glens.

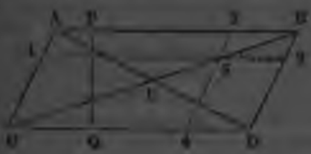
Mr. Darwin's hypothesis has the further advantage of offering a plausible explanation of the occurrence of erratic boulders of granite, which in places encumber the lines of beach. These may be easily supposed to have floated on icebergs from even distant points, and to have quietly rested on the beaches, and it is certainly difficult to account otherwise for the phenomenon. Enough has been said to show within how small a compass the question as to the origin of the parallel roads of Lochaber has been brought. In order to complete the solution of the problem, it is desirable to repeat very carefully the levelling operations which have been attempted by Sir T. Lauder Dick and Dr. MacCulloch.

It appears almost certain that the 'line' in Glen Gluoy is exactly level with the summit of drainage between it and Glen Roy; the shelf of Kilfinnin and the upper shelf in Glen Roy in like manner are exactly level with the watersheds dividing them from neighbouring valleys. The connection of these facts with Sir T. Lauder Dick's hypothesis of subsiding lakes in the valleys appears more evident than with Mr. Darwin's speculation of rising land.

Very exact levelling operations have proved that the real level of equilibrium of the sea is the *half tide line* (See *British Association Report for* 1837-8), but beaches are commonly found at the high-water level, which varies so much from the form and direction of channel and other courses, that *perfect horizontality* in the whole extent of the lower shelf of Glen Roy, Glen Spean, and Glen Treig would be only a dubious argument in favour of its marine origin. To determine the real differences of level between the highest beach in Glen Roy and the shelves of Glen Gluoy and Kilfinnin is equally important, since possibly these differences may not be at all greater than what are known to take place in some neighbouring arms of the sea which admit the tide unequally. Finally, we ought to know the true form of the imaginary surface to which the roads are parallel. They may lie nearly and yet not accurately in horizontal planes; if a real deviation from the horizon were found on comparing distant points, this might be symmetrical to a synclinal or anticlinal axis, and however small such *regular* deviation, it would have the same kind of interest in geology as the discovery of a true axis of movement in Scandinavia or Dorsetshire. Adequate observations on this subject may be difficult in Lochaber, of patience, has overcome all obstacles of mere levelling in the beautiful operations executed by Mr. Bunt, on a line chosen by Mr. Whewell, between Bristol and Axmouth; and the results which, some years or centuries hence, may seem to emerge from that splendid work, might perhaps be even now anticipated by a summer's work of the ordnance surveyors in the valleys connected with Glen Roy.

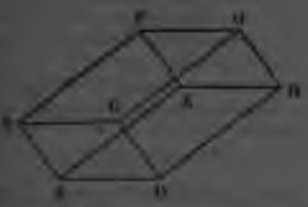
(MacCulloch, in *Geol. Trans.*, vol. iv.; Sir T. Lauder Dick, in *Trans. of Roy. Soc. of Edinb.*, vol. ix.; Darwin, in *Phil. Trans. for* 1839.)

PARALLELOGRAM (παραλληλό-γραμμον, parallel-lined figure) is the mathematical term for a four-sided figure of which the opposite sides are parallel. Such a figure may be obtained from *any* four-sided figure by bisecting the four sides and joining the adjacent bisecting points. When all the angles of a parallelogram are equal, they are therefore right angles, and the figure is called a RECTANGLE. When the sides are also equal, the figure is a SQUARE; matters of more historical interest are connected with either of these terms than with the generic term parallelogram. Referring therefore to those articles, we shall here give the principal properties of parallelograms in general.



1. The opposite sides are equal, as A C and B D.
2. The opposite angles are equal, as A C D and A B D, and adjacent angles (as those at A and B) are together equal to two right angles.
3. The diagonals (A D and B C) bisect one another.
4. The sum of the squares on the four sides is equal to the sum of the squares on the diagonals.
5. The area of a parallelogram depends only on the side (as C D) and the perpendicular distance (P Q) between that and the opposite side; so that parallelograms on equal bases and between the same parallels are equal.
6. If the point (5) be taken on a diagonal (C B) and made the vertex of a pair of parallelograms (A125 and D453) lying in the equal triangular halves of the parallelogram, these parallelograms will be equal to one another in area.

PARALLELOPIPED (παραλληλ-επίπεδον, parallel-plane solid), more correctly written *parallelepiped*, is the name given to a solid contained by six parallelograms, which are equal and parallel, two and two. It is in fact a quadrangular prism.



When all the parallelograms are rectangles, we have one of the figures to which our eyes are most accustomed, as in the cases of a die, a box, a plank, a room, &c. &c. Persons not acquainted with mathematics would hardly believe that English mathematicians seldom express this most simple and elementary of all solids in less than ten syllables, as follows:

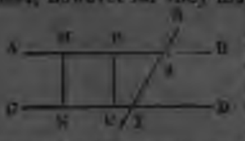
rect-ang-ul-ar par-all-el-o-pi-ped.

A more simple term might easily be obtained, and one perfectly consistent with analogy, namely, *right solid*. Thus a right line might be conceived as generated by the most simple motion of a point; a right surface (or rectangle) by the most simple motion of a right line; and a right solid (or rectangular parallelopiped) by the most simple motion of a right surface. We shall consider the properties of a right solid in the article RECTANGLE.

When the adjacent rectangles of a right solid are squares, the solid is a CUBE, for which fortunately there is a shorter term than equilateral rectangular parallelopiped.

The number of solid units in a parallelopiped is found by multiplying the number of square units in either base by the number of linear units in the perpendicular distance between that base and the opposite one. The diagonals A G, B H, C E, D F, meet in the same point, which bisects them all, and the sum of their squares is equal to the sum of the squares of all the twelve sides of the solid.

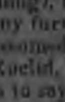
PARALLELS (παράλληλαι, by the side of each other), the name given by the Greek geometers to lines in the same plane having that relation of situation of which it is one of the most obvious properties that such lines never meet, however far they may be produced or lengthened.



If we examine the properties of lines experimentally, it will be easy to satisfy ourselves of the existence of such pairs as A B, C D, which neither diverge nor converge, and to which common perpendiculars, such as M N and P Q, all of the same length, can be drawn through any point of either. Moreover the angles R S B and R T D, made by the same line with both, will be found to be the same. If then we take the notion of permanence of direction, which always accompanies that of straightness [DIRECTION], and also the notion of differing directions, which is suggested by two lines which make an angle, we may readily see that the relation of situation which, adopting Euclid's term, may be called *parallelism*, is really that which would be also conveyed by the words sameness of direction; so that if two lines A and B be parallel, A may be substituted for B or B for A, in any proposition which involves relations of direction only, without affecting the truth of that proposition, if true, or its falsehood, if false.

Geometry, as every beginner knows, depends upon a small number of self-evident truths, or rather of propositions the truth of which (*with one exception*) is so soon and so easily perceived, that no one doubts of them when stated with ordinary attention to clearness of expression. The exception alluded to appears for the first time in Euclid, and has been the occasion of a controversy which has lasted from his time to the present.

It will be remarked that the definition of parallel lines is purely negative; it describes what they are not, not what they are: if lines which meet be called intersectors, parallels are non-intersectors. Those who would found geometry upon definitions entirely, may think that the difficulty of the theory of parallels arises from insufficient definition: but those who believe it to be deducible from real and positive conceptions, having nothing arbitrary about them, must suspect that, in this purely negative definition of parallels, we have not sufficiently described that very obvious relation of position which distinguishes parallelism from convergence, however short the lines we image to ourselves, or however little we think of what will take place if they are produced. Euclid, proceeding upon axioms the admission of which is not considered to be a question connected with the present difficulty, establishes the following proposition:—If the two lines S B and T D make the angles P S T and S T D equal, or R S B and S T D equal, or B S T and S T D together equal to two right angles (all which amount to the same thing), then S B and T D are non-intersectors. But before any further step can be made, it must either be proved or assumed that in every other case they are intersectors, and Euclid, being unable to prove it, assumes it directly. That is to say, he requires it to be granted that if B S T and S T D be together less than two right angles, S B and T D will meet, if produced, and on that side on which they make with S T the angles less than two right angles. The last clause is not a necessary part of the axiom, since it can be shown, independently of the present theory, that two lines which meet must make angles together less than two right angles with any line which cuts them internally.



Euclid obviously puts the *whole* difficulty into an assumption; which, though the most direct course, is not that which is best calculated to give the highest degree of evidence to geometrical truths. For it is a more obvious proposition that two lines which intersect one another cannot *both* be parallel to a third line, and this being granted, Euclid's axiom readily follows. If it should be objected that this is merely Euclid's axiom in another form, it is replied that the form is a more easy one, and therefore preferable: just as it would be wiser to assume 'Every A is B and every B is A,' than the identical but more complicated proposition 'Every A is B, and everything which is not A is not B.'

It is known then that the difficulty is entirely removed if we grant that 'two lines which intersect are not both parallel to any third line,' or, which is the same thing, that 'through a given point not more than one line can be drawn parallel to a given line.' The theory of Euclid being thus improved as far as it is capable of being done by a mere difference of statement, it remains to ask, 1, Whether assumption can be dispensed with altogether, and a direct proof of Euclid's axiom, or something equivalent to it, given? 2, If the preceding be answered in the negative, can any more simple assumption be made the foundation of the theory?

The attempts to answer one or the other question in the affirmative have been very numerous, and have (without any exception but one in which new axioms of another sort are introduced) tacitly contained the defect which their authors were desirous of avoiding. The author of 'Geometry without Axioms' has collected and commented on thirty instances, of which we here make a brief abstract, adding one or two more.

1, The axiom of Euclid in question. 2, Ptolemy; his proof assumes the symmetricality of parallel lines on one side, and the other of any line which cuts both. 3, Proclus assumes that intersectors diverge infinitely from the point of intersection, and that parallels do not. 4, Clavius assumes that a line which is everywhere equidistant from a straight line, is itself straight. 5 and 6, Two demonstrations of Dr. Thomas Oliver (1604) assume Clavius's axiom. 7, Wolf, Boscovich, T. Simpson (in the first edition of his 'Elements'), and Bonnycastle, define parallel lines as those which always preserve the same distance, which is Clavius's axiom in the disguise of a definition. 8, D'Alembert would define parallels as lines, one of which has two points equidistant from the other, but acknowledged that he could not complete the proof of the axiom of Clavius. 9, T. Simpson ('Elements,' 2nd edition) proposed to assume that two lines, one of which has two points unequally distant from the other, must meet. 10, Robert Simpson proposed to assume that a straight line cannot first approach to and then recede from another, without cutting it. 11, Varignon, Bezout, &c. would define parallels as lines which make the same angle with a third line: if *a* third line mean one third line, the difficulty remains just as before; if *any* third line, the difficulty is tacitly removed by an assumption. 12, Ludlam, Playfair, &c. recommend the axiom which we have also recommended, namely, that two intersecting straight lines cannot be both parallel to a third. 13, Leslie proposes to attain the same axiom in a sort of experimental manner, by making a line revolve about a point. 14, Playfair (in his Notes) proposes to assume that a straight line which turns completely round, and thus regains its first position, must turn through four right angles, whether it constantly revolves about one point, or whether the pivot of revolution changes. 15 and 16, Franceschini (1787) proposes to assume that the projections of a straight line on a line making an acute angle with it, increase without limit with the projected line. 17, Some have proposed to define parallels as 'lines having the same direction,' assuming it to be obviously contained in the conception of direction, that two similar directions make the same angle with any other direction. 18, Mr. Exley (1818) proposes to assume that if four equal straight lines, each at right angles to the preceding, do not meet and enclose a space, a fifth such line would do so. 19, Dr. Creswell proposes to assume that through any point within an angle less than two right angles, a straight line may be supposed to be drawn cutting the two straight lines which contain the angle. 20, Professor Thompson makes it an axiom that 'if a triangle be moved along a plane, so that its base may always be on the same straight line, its vertex describes a straight line equal to that described by either extremity of the base. 21, M. Legendre (in the earlier editions of his 'Elements') makes a direct appeal to the senses. 22, In the seventh edition he assumes (as in instance 15) that a magnitude increases without limit, where perpetual increase is all that is demonstrable. 23, In the twelfth edition he fairly brings the disputed proposition to rest upon the axiom, that if two angles of a triangle diminish without limit, the third (whatever the base may be) approaches without limit to two right angles, a proposition not admissible when, as in M. Legendre's final construction, the base at the same time increases without limit. 24, In a note to the same edition, he demands as an axiom that no straight line can be entirely included between two straight lines which make an angle less than two right angles, which may easily be shown to be nothing more or less than Euclid's axiom. 25, He attempts a proof of the last, which fails. 26, M. Legendre's analytical proof, which we shall presently examine. 27, M. Lacroix would confine the assumption of Euclid to the case in which one of the internal angles is a right angle and the other less. 28, M. Bertrand extends the use of the term equality; we shall afterwards examine his proof. 29, Mr. Ivory assumes a right to construct a series of triangles in a manner which cannot be certainly done unless an assumption as difficult as in (20) be made: and 30, Professor Young makes a modification of the preceding, which does not remove the difficulty.

For further information we may refer to the work from which the preceding abstract is taken. The author of it proposes his own system, the latent assumption of which is, that if equal straight lines make an angle, and other straight lines equal to them be attached to their extremities at the same angle, the remaining extremities of the second pair of straight lines will *not** always meet.

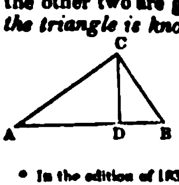
The author of 'Geometry without Axioms,' Colonel Perronet Thompson, whose erudition on this subject would alone entitle any attempt of his to attention, has, while this article was in the press, published a new pamphlet on the subject, in which he proposes to deduce the properties of the equiangular spiral, and to make them the foundation of a proof of Euclid's axiom. Not having been able to give this pamphlet sufficient attention, we can only here say, that it assumes the doctrine of limits, and the theorem that velocities (in one case at least) are to one another in the limiting ratio of spaces described in the same times. Whatever we may, on closer examination, think of this method as evidence for producing conviction, we cannot take such an assumption as removing the geometrical difficulty, since, by the introduction of a totally new line, it leaps the conventional boundaries of geometry [GEOMETRICAL]: to say nothing of the question which may fairly arise, as to whether the axioms of the theory of limits are not as difficult as that of Euclid.

Two proofs have been referred to as requiring further explanation: those of MM. Legendre and Bertrand. We take them successively.

The first assumes all that knowledge which is derived from algebra and the theory of algebraical operations. We premise that the theory of parallels may be strictly deduced, though not without some trouble, if it can previously be shown that the three angles of a triangle are equal to two right angles. Let there be a triangle of which the base contains c linear units, and the opposite angle C angular units, the other angles containing A and B units. Then it can be easily shown that any other triangle which has the same base c and the same adjacent angles A and B must be in all respects equal to the first: that is, c, A, and B being the side and adjacent angles of a really existing triangle, C is given when c, A, and B are given. There must then be some analytical mode of expressing C in terms of c, A, and B, such as

$$C = \phi(c, A, B).$$

From such an equation, if it exist, c can be found in terms of A, B, and C, that is, the length of a straight line can be expressed by means of angles only. Now it is known that no equation can determine a magnitude by means of magnitudes no one of which is of the same kind with it; and the only way of avoiding this supposition is by supposing that c does not enter the equation at all, or that $C = \phi(A, B)$, so that the third angle of a triangle is given when the other two are given, whatever the side may be, *provided the triangle is known to exist*. Let there be a right angled triangle ACB, and let CD be perpendicular to AB; then the triangles ACB and ACD, have a common angle at A, and a right angle in each: consequently their third angles are equal, or AC



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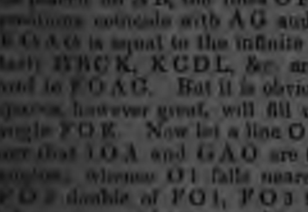
* In the edition of 1833, this assumption was explicitly made. A [illegible] the 'Journal of Education' (vol. vii, p. 105) having pointed this out, the [illegible] 'provided the straight lines do not meet' were added (in the edition [illegible]) [illegible] the enunciations of the leading propositions of the proof. This [illegible] moves the difficulty from the propositions themselves, but throws it upon [illegible] consequences; and the final result only remains proved, provided [illegible] do not always meet: that is, the proposition that they do not always meet [illegible] remains an axiom. The work is well worth the perusal of the student [illegible] we have no doubt whatever that in respect to the theory of parallels [illegible] amendment of Euclid.

= A B D. Similarly D C B = C A B; whence the angles at A and B are together equal to a right angle. And if the two acute angles of a right angled triangle be equal to one right angle, it is readily shown that all the three angles of any triangle are equal to two right angles.

It is not our intention to go fully into the objections which have been made to this proof, or to Legendre's answers; all which may be found in the notes to Dr. Brewster's translation of Legendre. It has the disadvantage of being founded upon a science which requires more and harder axioms than geometry itself, and of which the particular process employed, namely, inversion of a function, is in many cases full of unexplained difficulties; while it has the advantage of not appealing to any new notions of space. As an illustration of the connexion between algebra and geometry, it must always be valuable: but we suppose no one would think of making it the foundation of geometry. Some objectors imagined that Legendre would infer that a base with two adjacent angles together less than two right angles, must be the base of a triangle; or that because the formula applies wherever there is a triangle, that there must be a triangle wherever the formula applies. If this were the case, undoubtedly they were right in saying that Legendre did in fact assume Euclid's axiom: but if, as we apprehend, he would have applied the proposition thus proved of existing triangles, to the proof of Euclid's axiom, he should certainly have stated his intention more distinctly in his reply. It seems to us that he took it as admitted on all sides how to deduce Euclid's axiom, while his opponents imagined that he considered himself as having proved that axiom.

The proof of M. Bertrand is as follows:—Let it be granted that two spaces, *whether finite or infinite*, are equal,* when one can be placed upon the other so that any point whatsoever of either lies upon a point of the other: that is, let it be legitimate to say, of the word equal as thus used, that spaces which are equal to the same space are equal to one another. Granting this, it is easily shown—1, that the infinite spaces of equal angles are equal; 2, that of two angles, the infinite space contained in the greater is greater than the infinite space contained in the less.



Let there be two lines, O F, A G, making with O A internal angles F O A, G A O, equal to two right angles. Then O F and A G are parallel. Take A B, B C, C D, &c. each equal to O A, and make the angles H B C, K C D, L D E, &c. all equal to F O A or G A B. Let all lines with arrow-heads be produced without limit in the direction in which the arrow-head points. Then if O A be placed on A B, the lines O F and A G will in their new positions coincide with A G and B H, or the infinite space F O A G is equal to the infinite space G A B H: and similarly H B C K, K C D L, &c. are all equal to one another and to F O A G. But it is obvious that no number of these spaces, however great, will fill up the infinite space of the angle F O E. Now let a line O 1 be drawn in such a manner that 1 O A and G A O are together less than two right angles, whence O 1 falls nearer than O F to O E. Take F O 2 double of F O 1, F O 3 treble of F O 1 and so on: whence, since of two quantities which bear a ratio, the less may be multiplied so as to exceed the greater, some multiple of F O 1 must be greater than F O E, whence some multiple of the infinite space F O 1 is greater than the infinite space F O E. But no multiple of F O A G will be so great as F O E; whence the infinite space F O 1 must exceed the infinite space F O A G. Therefore O 1 produced must cut A G: for if not, the space F O 1 would be entirely contained in F O A G, and the former could not exceed the latter.

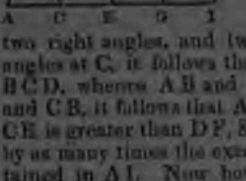
We have not noticed the numerous attempts at the solution of the difficulty which proceed by tacit assumption or illogical process, under the pretence of avoiding the axiom of Euclid, without substitution of any other. We shall conclude this article with an account of a result contained in a paper, by Legendre, in the 12th volume of the 'Memoirs of the Institute,' being his latest attempt at the solution of the problem. It is what he properly styles a geometrical translation of the analytical proof already noticed, and its chain of reasoning is contained in three propositions.

1. It is impossible that the sum of the angles of a triangle can in any case exceed two right angles.

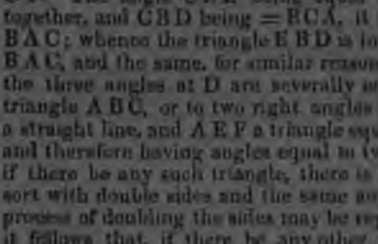
2. If there be any one triangle which has angles together equal to two right angles, the same must be true of all triangles.

3. If the angles of a triangle be not equal to two right angles, then angles alone may be made to determine a straight line.

1. If it be possible, let there be a triangle B A C having its angles together greater than two right angles. In A C produced take C E, E G, G I, each equal to A C, and make the angles D C E, F E G, &c. each equal to B A C, and let C D, E F, &c. be each equal to A B. Join B D, D F, &c., which are not known to be in the same straight line, though they are so. Then the triangles D C E, F E G, &c. are severally equal in all respects to B A C. And because the angles at A, B, C are together (by hyp.) greater than two right angles, and two of them are equal to two of the angles at C, it follows that the angle A B C is greater than B C D, whence A B and B C being severally equal to D C and C B, it follows that A C is greater than B D. Similarly C E is greater than D F, &c., whence A I exceeds B D F H K by as many times the excess of A C over B D as A C is contained in A I. Now however small this excess may be, it may be multiplied until the multiple exceeds twice A B, or A B and K I together. That is, A I, one side of a figure, may be made greater than A B, B D, D F . . . K I, the sum of all the other sides; which is absurd. Hence, it is not true that the angles of any triangle are together greater than two right angles.



2. Let there be any one triangle A B C in which the sum of all the angles is two right angles. Make the angle B C D = A B C, and C B D = A C B, whence the triangle B D C is in all respects equal to A B C. Produce A B and A C each to double of its length, and join E, D, and D F. The angle C B E being equal to B A C and A C B together, and C B D being = B C A, it follows that E B D = B A C; whence the triangle E B D is in all respects equal to B A C, and the same, for similar reasons, is D C F. Hence the three angles at D are severally equal to those of the triangle A B C, or to two right angles; and thus E D F is a straight line, and A E F a triangle equiangular with A B C, and therefore having angles equal to two right angles. Or, if there be any such triangle, there is another of the same sort with double sides and the same angles; and since this process of doubling the sides may be repeated to any extent, it follows that, if there be any other given triangle, a triangle can be found with longer sides, and having the sum of its angles equal to two right angles.



Next, any triangle A M N which has the angle A, must have the sum of all its angles also equal to two right angles. Continue the preceding process until the triangle A M N is completely inclosed, say in A E F, and join E, N. Then all the angles of the three triangles A M N, M N E, N E F, make up the angles at A, E, F (two right angles), those at M (two right angles), and those at N (two right angles); six right angles in all. Consequently each set of angles, in each triangle, must be equal to two right angles; for all three sets making up six right angles, no one set can fall short of two right angles, without another set exceeding it, which has been shown to be impossible.

Lastly, on the preceding assumption (namely, that there is one such triangle), every triangle has the sum of its angles equal to two right angles. Let P Q R be any triangle

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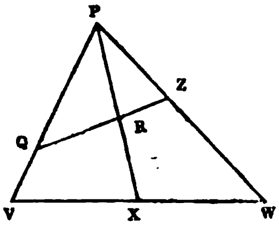
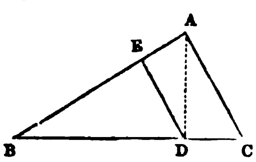
* The author of 'Geometry without Axioms' gives [illegible] for the axiom that [illegible] is only to be predicated of finite magnitudes. But without insisting on [illegible] of [illegible], or any one else, it is for the reader now to ask himself whether he can, by comparing the infinite spaces contained in equal and unequal angles, obtain a distinct conception of equality, of greater and of less. If so, the proof of M. Bertrand must be admitted by him; if not, he has a right to [illegible]. We are inclined to think that it is a proof to [illegible].



not equiangular with A B C; one of its angles must be less than one of the angles of A B C; for if not, the sum of the angles P, Q, R would be greater than that of A, B, C, or greater than two right angles. Let it be that P is less than A, and make Q P Z equal to B A C, constructing, by the preceding process of doubling the sides, a triangle V P W containing P Q R. Then since P V X has an angle (at V) common with P V W, the angles of P V X are together equal to two right angles, and because P V X has an angle in common with P Q R, the angles of the latter are also equal to two right angles. Hence, if any one triangle have its angles equal to two right angles, the same must be true of all triangles whatsoever.

3. If then we deny the preceding truth in the case of any one triangle, we must deny it in the case of all. Let it then be universally denied; and, taking any triangle A B C, take a point D, at which make the angle B D E = B C A. Then the angle B E D must be greater than B A C; for if not, D E A and E A C are at least equal to two right angles, and, E D C and A C D being together equal to two right angles, the angles of the triangles E D A, A D C, are together at least equal to four right angles, which is denied. For it is denied that either set is equal to two right angles, and it has been shown that neither set can be greater. In like manner it may be shown that if D move from C to B (the angle B D E being always = B C A), the angle B E D must continually increase, and can therefore only have a given value for a thereby determined value of B D. That is, by assigning the angles B, D, E, the side B D can be absolutely laid down. Now since angles might be given in numbers (taking the right angle, which is absolute, as a unit), it therefore follows that the length of a straight line might be handed down from generation to generation, by means of numbers only, without any dependence on a linear unit. This is the same conclusion as follows from the analytical proof, against those who would deny its conclusions.



We consider the preceding process as containing the most remarkable addition which has been made to the theory. With regard to the whole question, we do not consider the difficulty as one of a different kind from that of the quadrature of the circle or the trisection of the angle. In the earlier stages of mathematical investigation, all that was not evidently impossible was attempted, and failure was, properly and modestly, attributed to the want of sagacity in the investigators. In the instance before us, the object was to deduce positive properties from a purely negative definition, involving, be it observed, the idea of infinity. For if we say that parallels are lines which never meet, however far produced, we must, in the hypothesis 'let A B and C D be two parallel lines,' contemplate every point of both, however remote from A and B. The demonstration of M. Bertrand appears to us to assume considerations which are indispensable to the direct treatment of this negative definition; nor can we imagine the positive deduction of properties from the assumption of lines which never meet, without making their intervening space, as compared with other spaces, an object of reasoning. And even if the preceding process of M. Legendre should be allowed, so far as proving that one triangle only need be shown to have the sum of its angles equal to two right angles, and should the final theorem be ultimately completed by a less objectionable third process (of which we do not entirely despair), it may be doubted whether right reasoning will be promoted by the arbitrary rejection of notions intimately connected with those which are necessary for the perfect conception of a definition. On this the whole question must at last turn: it will readily be granted that a studied exclusion of a particular figure (for instance, of the equilateral triangle) would be no real gain to the strictness of geometry, even though it should be shown that the whole of Euclid might be established without it. The new considerations brought forward by M. Bertrand have not yet received the degree of attention which we will venture to prophesy must yet be given to them. When they have been maturely discussed, the following question will arise:—In admitting the notion and definition of parallels, and rejecting the comparison of their intervening spaces with angular spaces, are we, or are we not, in the position of those who admit one notion, while they exclude another which is as much of kin to the first as that of an equilateral triangle to any other triangle? We should be sorry to see this question settled either way without such an examination of the nature of our ideas of magnitude, and in particular of the connection of finite and infinite, as has not yet been made.

PARA'LYSIS (a Greek word, παράλυσις, which signifies literally a 'loosening' or 'relaxation') is the diseased condition in which the natural power of sensation or motion is lost in any part of the body.

In the article Nerve and Nervous System, the distinction was pointed out between the nerves of sensation and of motion, and it was stated that though most of the nerves distributed through the various parts of the body contain filaments of both kinds within the same sheath, yet the two orders of filaments are distinct in their origins and arise from separate portions or tracts of the brain and spinal chord. From this circumstance the differences betweeen the principal varieties of paralysis arise. If a sensitive nerve, or the tract of nervous matter from which the sensitive nerves of any part arise, be destroyed or seriously diseased, there will be a loss of sensation in that part, but its natural power of motion will remain; if the same injury befal a motor nerve, or a centre of origin for motor nerves, the part supplied therefrom will lose its motion, but retain its sensibility; and if a mixed nerve, or both nervous centres simultaneously, be affected, there will be a loss at once of sensation and of motion. Hence we have two distinct kinds of paralysis—loss of sensation, which is sometimes called *anæsthesia*, and loss of motion, to which the term paralysis, or palsy, is by some exclusively applied.

Each of these varieties of paralysis may vary in its degree of severity, or in the extent of the part of the body which it affects. For example, either kind may be *complete* or *incomplete:* in the former, the sensation or loss of motion, or both, are completely destroyed; in the latter, they are only impaired In its varieties of extent, paralysis of sensation may affect either a single nerve, as in loss of sight when dependent on disease of the optic nerve [Amaurosis]; in loss of smell, or anosmia, from affection of the olfactory nerve; in deafness, from disease of the auditory nerve; and loss of taste, from disease of the nerves appropriated to that function: or it may affect the sensitive nerves of a limb or of a variable portion of the body. In like manner paralysis of motion may affect a single muscle, as in *ptosis*, or dropping of the eyelid, from disease of the third nerve; or it may occur in a part of the muscles of the face, or the muscles of one or more limbs, or of a part of the trunk and limbs. Lastly, whole regions of the body may be paralysed; and of these cases the chief varieties are, *hemiplegia*, in which one side—half of the body—is deprived of sensation or motion, or of both; *paraplegia*, in which the lower part of the body is paralysed, while the upper retains both sensation and motion; and general paralysis, in which the loss of nervous power extends over nearly every part of the body.

Other varieties of paralysis are described from peculiar circumstances in their cause or symptoms; as *lead*-palsy, which is produced by the influence of lead, either locally applied, as to the hands of painters, or received into the system generally; *creeping* palsy, which, commencing in a limited part of the body, gradually extends over a larger portion of it; *shaking* palsy, in which the loss of motion being incomplete, any attempt at its exercise is effected by a trembling unsteady action, like that of a fatigued muscle.

The conditions under which these various forms of paralysis arise are numerous. Its most common and general causes are those which mechanically destroy that condition which is essential either to the conduction of sensitive impressions to the brain and to their perception by the mind, or to the conveyance of the stimulus of the will through the nerves of motion to the muscles. Thus pressure on the brain, by a fracture and depression of the skull [Head, Injuries of], or by a large effusion of blood [Apoplexy], or by large tumours, or an excessive fulness of the arterial or venous system of the brain, may, by preventing the free circulation of the blood through every part of its substance, produce general paralysis. Disorganization of the brain by softening or other excessive change of structure has the same effect, but often in a less degree, producing not a complete loss, but an im-privation of nervous power. Injuries of the same kind affecting only one side of the brain produce hemiplegia, the loss of power existing on the side of the body opposite to that on which the brain is compressed, in consequence of the decussation of the nerves which takes place at the medulla oblongata. [BRAIN.]

In like manner a similar compression of the spinal chord in any part will produce a paralysis of all the parts of the body whose nerves come off below the level of the injured part; and a similar obstruction applied to a single nerve will affect only that part which it supplies. The effect is the same, whatever be the nature of the cause preventing the performance of the functions of the nerves or their centres; the results of each differing only in the suddenness or slowness, or the degree of intensity with which its symptoms are produced.

There are some other but rarer and generally less serious forms of paralysis, in which no material change is discoverable in the structure of the nervous system. These are called functional or idiopathic paralyses; but it may be reasonably doubted whether they do not all, or for the most part, depend on some alteration not yet discovered, and perhaps incognizable by our present means of investigation. Such paralyses occur in some anomalous forms of nervous diseases, as in hysteria, and appear to be connected by sympathy with disorder of the uterine or digestive functions; they are also not unfrequently produced by the introduction of poisons, as in those who work with lead or mercury.

General paralysis, in which all sensation and voluntary motion are impaired or lost, is most commonly the result of apoplexy, or of severe injury to the head, producing concussion or compression of the brain; and indeed it may be said to exist in all cases of complete coma or insensibility. More rarely it is produced gradually; the patient losing in succession the power of motion in all his muscles, and at last existing only with an internal life, but disabled from all active communication with the external world. This state is usually the result of disease of the brain or spinal chord gradually spreading through their substance; and especially of disease of the latter spreading upwards.

The most frequent if not the only cause of paraplegia is injury or disease of the spinal chord; and this may originate in its own structure, or be produced by injuries or diseases of the vertebral column or other parts surrounding it. Paraplegia, when the result of disease, commonly affects first the lower extremities and the parts below the level of the pelvis, because the first part affected in the greater number of diseases is the lower portion of the spinal chord, from which the nerves supplying the lower extremities and pelvic viscera are derived. When produced by injuries of the vertebral column however, the paraplegia may from the first affect the body to a much higher level; its extent being always determined by the height in the vertebral column at which the injury is inflicted. In either case the disease, whether original or consequent upon injury, tends to spread up the chord; and with a corresponding progress, the paralysis rises up the trunk, and affects successively the chest and arms, terminating in death when the disease has reached the origin of the phrenic nerves, upon which the movements of the diaphragm depend.

In this form of paralysis, when all sensation and voluntary motion are destroyed, it is not rare to find involuntary movements produced by irritating the skin of the insensible parts. These motions are of the class which are referred to the reflex action of the spinal chord [NERVE]; the power of conducting impressions to and from the brain is lost, but the power which the chord possesses of exciting motions when impressions are made upon it, remains. The patient thus affected is indeed, as far as his nervous system is concerned, in the same condition as a beheaded animal; and the motions produced by irritating the parts below the diseased or injured portion of the chord are of the same kind as those observed after decapitation.

In paraplegia the parts deprived of nervous connection with the brain are, even more than in any other form of paralysis, liable to mortification when long subjected to pressure; and hence the sloughing of the back, which so commonly tends to shorten the patient's life. The sensibility to the pain produced by long continued pressure being destroyed, the patient would not be inclined, even if he were able, to make those frequent changes of posture by which a healthy person avoids its dangers.

Hemiplegia, in which the paralysis is confined to one side of the body, usually affects (as paraplegia does) the sensitive and the motor nerves simultaneously. This is by far the most frequent form of paralysis, and is that by which those popularly called paralytic are usually affected. Hemiplegia generally occupies exactly one-half of the body, the middle vertical plane separating the healthy from the paralysed portion. It is at once easily recognised in any patient by the flatness and smoothness of the affected side of the face, by the angle of the mouth being drawn over towards the opposite side, and by a general awry position of the features. The arm hangs powerless by the side; and in walking, the patient drags the affected leg after him, or, raising it from the ground by depressing the opposite side of the pelvis, lets it swing forward with its toe pointed towards the ground like a pendulum. Hemiplegia is most frequently the consequence of apoplexy [APOPLEXY], remaining after the patient has recovered from the complete insensibility or general paralysis by which the seizure was at first followed. More rarely it appears to arise from other causes, and is not preceded by any fit, but is developed by degrees from slight to perfect loss of nervous power.

The varieties of paralysis in which single and small portions of the body are affected, do not in general continue permanently limited to the part first attacked, but are often precursors of the more general affections already described. The most important forms, and those in which the paralysis most frequently remains for a long time local, are those in which the eyelids or muscles of the eye, and those in which the muscles of the face are affected.

In paralysis of the muscles of the eye, the most commonly affected are the elevator of the upper eyelid and the orbicular muscle of both the eyelids. When the former loses its power, the eyelid drops, and the eye is constantly more or less closed; when the latter is affected, the eye cannot be shut, and remains permanently wide open. The dropping of the upper eyelid (or ptosis) is dependent on a disease or injury of the third pair of nerves, and is usually accompanied by a paralysis of some of those muscles of the eyeball which are supplied by the same nerve; so that the position of the eye is altered, or it cannot be freely moved. The permanent openness of the eye is the result of disease of the seventh or facial nerve, or of its branch supplying the orbicular muscle; sometimes this latter branch alone is implicated, but more frequently the whole trunk is affected, and there is coincident paralysis of all the muscles of the face. As far as regards their influence on vision, both cases are almost equally injurious; the first by placing a veil constantly over the front of the eye; the second by destroying the power by which particles of dust, &c. are removed from the surface of the eye, and thus leaving it exposed to the dangers of constant irritation and inflammation.

In paralysis of the face many different conditions are observed, according to the nerve which has been diseased or injured. The sensation of the face depends entirely on the sensitive or larger portion of the fifth pair of nerves [BRAIN], the motion of its muscles on the seventh or facial nerve, and the motion of the muscles of mastication on the motor or small portion of the fifth pair. Now if either of these three nerves or their sources in the brain be separately injured, the paralysis will be limited to a loss of sensation, a loss of the motion of the muscles of the face, or a loss of the motion of those of the jaw, on the side affected. In the most frequent cases of affection of the fifth nerve, both its sensitive and motor portions are injured, and there is both a loss of motion of the muscles of the jaw and a loss of sensation of the whole of the skin of one side of the face.

Lastly, a limb, or a part of a limb, or a single muscle or set of muscles in any part of the body, may be paralysed. In some cases such an affection is only a sign of disordered digestion, and thus they occur chiefly in children; in others it exists in what is called general nervousness, as in hysterical women, who, with many other strange disorders, sometimes lose the power of swallowing or speaking. Most frequently however these forms of local paralysis depend on injury of the nerves of the part, which are compressed by tumours or involved in some diffused disease.

An important class of local paralytic affections includes those in which recent investigations have detected the sources of many cases of congenital or acquired deformity, such as club-foot, curvature of the spine, squinting, &c. In these, one or more muscles of a limb or organ being from birth or from childhood weak or powerless, its antagonist muscles draw the part into an unnatural position, and hold it there firmly and permanently fixed. One of the most important achievments of modern surgery is the cure of these affections by the division of the contracted muscle or its tendons. Such operations for club-foot and wry-neck are now commonly performed; and Professor Dieffenbach of Berlin has within the last few months cured three cases of squinting by a a similar proceeding.

These however are the only cases in which general rules of treatment can be laid down. The varieties of causes from which paralysis may arise afford sufficient evidence that its treatment in different cases must vary greatly. It cannot indeed be said to be a disease of itself, since it is only a sign of some disorder of the nervous system, which is often seated at a distance from the part whose motion or sensation is lost; this disorder also is of no definite kind, but may be the result either of hæmorrhage, or inflammation, or slow structural change of the nervous substance; or it may be produced by the pressure of fractured bones, or tumors, &c. In each case therefore the cause of the paralysis must be treated before there can be any expectation of removing its effects; and for this portion of the treatment the principal means are detailed in the article APOPLEXY.

PARAMARI'BO. [GUYANA, DUTCH.]

PARAMATTA, a town in the British colony of New South Wales, situated in Cumberland county, at the mouth of the small river Paramatta, and at the head of the harbour of Port Jackson. Its distance from Sidney, the capital of the colony, is 18 miles by water and 15 miles by land. The population of the town in 1836 consisted of—

	Males.	Females.	Total.
Free—under 12 years old	504	412	916
above 12 years old	875	659	1534
Convicts . . .	387	763	1150
Total . .	1766	1834	3600

The large proportion of female convicts is occasioned by the establishment within the town of a penitentiary wherein such persons are confined before they are assigned for service, and where they are returned by settlers on the hands of the government. The building is further used for the confinement of females guilty of offences within the colony.

The principal street is a mile long; at the end farthest from the harbour is the country residence of the governor of the colony.

The town, when first founded, was called Rose Hill, but the native name of the river on which it stands has since been given to it. There is daily communication with Sidney by means of stage-coaches and steam-boats.

The observatory at Paramatta (founded in 1821) was the private observatory of Lieut.-General Sir Thomas Brisbane, an active and well-informed astronomer, during his residence in the colony as governor. At his return to England, the government adopted it as a public establishment, and it is now under the superintendence of an observer appointed by the Admiralty. For an account of this observatory, see 'Memoirs of the Astronomical Society,' vol. iii., p. 399.

PARA'METER. This term was first used in reference to the conic sections only, in which it was synonymous with latus rectum; that is, the perpendicular drawn to the axis through a focus, terminated both ways by the curve, was the parameter of the curve. It was afterwards used to denote any straight line or even numerical co-efficient, by the value of which one individual curve of a species may be distinguished from the rest. Thus the curve whose equation is $y = ax + bx^2$ has two parameters, a and b. This last phraseology is not in general use, and seems to have been reserved only for questions in which what is called the variation of parameters is to be employed. Thus when in the planetary theory the motion of a planet is ascertained by determination of the variation of the instantaneous ellipse [GRAVITATION; ORBIT], and of the motion in that ellipse, in contradistinction to determining the motion in longitude and latitude separately, the method of variation of parameters was said to have been employed. But the *parameters* of the orbits are now generally called their *elements;* and the first term is little used, though it occurs frequently enough to require notice in a work of reference.

PARAMICIPPA. [MAIIDÆ, vol. xiv., p. 300.]

PARAMITHIA, or PARAMYTHI'A, called by the Turks, Aidonát Kálesi, or the castle of Aidonat, or Ai Dho[illegible] (a corruption of Ἅγιος Δονάτος, St. Donatus), an inland town in the province of Albania in European Turkey, about 14 miles north of Parga [PARGA]; in 39° 32′ N. lat. and 20° 44′ E. long. The town is situated in the mountainous district which skirts the valley of the Vuró, probably the antient Cocytus, the inhabitants of which mountains maintain a partial independence, and are half shepherds, half warriors, or robbers. The city covers a large space of ground, and contains many good houses; it is situated on the slope of a mountain, the summit of which (about 1000 feet about the level of the plain) is precipitous, and is crowned with a castle. Almost all the habitations are formed into distinct groups, occupied by family alliances, which are often at war with each other. The houses are built of calcareous stone, roughly hewn from the mountain on which the town stands, and are shaded by luxuriant plane-trees, beneath which are fountains of delicious water. The fortress is extensive; in the substructure of its walls are many portions of antient masonry, and in one angle is an antient gateway, four feet wide, formed of three stones, now walled up. In the steep and rugged ascent from the town to the fortress are many large isolated dwellings, surrounded by gardens and having loopholes adapted for musquetry instead of windows, an indication of the unsettled condition of the county. The bazar is spacious, shaded with plane-trees, and cooled by delicious fountains. Beside the fortress or 'old castle,' there is a small fortress, or guard-house, called Galatà, on another insulated rock. To this fortress many additions were made by Ali Pasha. Some antient masonry of the foundations show that this summit was included in the antient Epirote city on whose site Paramythia stands. The population was estimated by Dr. Holland, who visited the town in 1813, at 9000, chiefly Mohammedans. There were five mosques and a Greek church. It was at that period the seat of a Greek bishopric conjointly with Parga, the bishop taking his title from both places. Subsequent statements reduce the population to 3500; a diminution resulting probably from the ravages and convulsions to which the country has been subject of late years. Paramithia was a leading member of the Souliot league against Ali, and was generally united with Marghariti, Gardhiki, and Draghomi. But these towns were frequently, when not pressed by external danger, at war with each other; and when this was wanting, the parties in each town were seldom long without fighting. Ali acquired possession of the town, partly by treachery, after the fall of Suli.

As in other Albanian towns, all the common articles of Albanian or Turkish dress are manufactured here chiefly by Mussulmans. The Greeks are for the most part only retail shopkeepers.

Paramithia occupies the site of an antient city of considerable extent and importance, though it has not been certainly identified with any name mentioned by antient writers. Perhaps it was one of the castles of St. Donatus repaired, according to Procopius, by Justinian. Several exquisite antient bronzes have been discovered in excavations, some of which were in the collection of the late R. P. Knight, Esq.

(Holland's and Hughes's *Travels in Albania;* Leake's *Travels in Northern Greece; Dictionnaire Géographique Universel.*)

PARAMI'THRAX. [MAIIDÆ, vol. xiv., p. 299.]

PARAMO'RPHIA, or THEBAIA, a vegetable alkali obtained by MM. Theboumbry and Pelletier from opium, in 1835. The former name was given to it because its composition, according to the analysis of Pelletier, appeared to be similar to that of morphia: by M. Couerbe it has been called thebaia; and by his analysis, as also by that of Dr. Kane, it appears to contain less oxygen than by that of Pelletier. This name is indeed most commonly adopted.

Paramorphia is white; its taste is rather acrid than bitter; it is scarcely soluble in water, but is readily dissolved by alcohol and æther, and most so when hot. By spontaneous evaporation these solutions yield paramorphia, which, from the æthereal solution, has the form of flat rhomboidal crystals possessing considerable lustre. This substance has strongly marked alkaline properties, dissolves readily in dilute acids, and is precipitated from them by the alkalis. The acid solutions do not yield crystals by evaporation.

Paramorphia differs from morphia in not reddening concentrated nitric acid, in not becoming blue with the salts of iron, and in yielding no crystallizable salts with the acids. It melts at 266°, and this distinguishes it from me-

[illegible] and narcotina, which fuse respectively at 194°, 302°, and 338° of Fahrenheit.

The following are the results of the analysis of this substance by the authors named:—

	Pelletier.	Couerbe.	Kane.
Carbon	71·310	71·976	73·98
Hydrogen	6·220	6·460	6·96
Azote	4·460	6·383	6·94
Oxygen	17·999	15·172	13·01
	100·	100·	100·

According to Magendie, paramorphia acts strongly on the animal economy, resembling brucia and strychnia in this respect.

PARAMOUNT. [Title.]

PARANA, River. [Plata, La.]

PARAPET (from the Italian *parapetto*, compounded of the Greek preposition *para*, 'against,' and *petto*, 'breast'), a low or breast-high wall or fence, to serve as a protection on bridges, terraces, platform roofs, &c., whence it is termed in German *brustwehr*, or breast-guard. In Italian architecture, parapets are generally balustrades. In Gothic architecture, the parapet is merely a continuation of the wall carried up above the edge of the roof, and finished by a coping; unless machicolated, in which case it projects and overhangs the walls below. [Machicolation.] In the Lombardic buildings of Italy there is seldom any parapet, the eaves of the roof finishing the elevation. The same is frequently the case in the Norman style, or else the parapet is quite plain; whereas in Gothic architecture it is generally embattled, even in ecclesiastical buildings, and both the battlements and the crenelles or spaces between them have usually moulded copings. In what is called Decorated Gothic, parapets and battlements are frequently enriched with pannels, or a parapet without battlements is so embellished. East Basham manor-house is a fine specimen of such decoration in domestic architecture. (Pugin's *Goth. Examples*, vol. i.) In many cases such pannelling is perforated; nor are open-work parapets of quatrefoil ornaments and other carved patterns by any means uncommon. At a later period instances occur of open-work for such purpose, forming the letters of some motto, date, or inscription. In Elizabethan buildings open-work parapets, forming various fantastical devices, are common.

PARAPHERNA'LIA. This term comprehends the dress and ornaments of a wife which she occasionally wears, and which she is entitled, under some limitations, to retain after her husband's decease. It cannot be accurately stated how much a wife may claim as her paraphernalia; for this will depend on the rank and fortune of the husband and wife. A widow is entitled to retain as paraphernalia ornaments which she has received from her husband, provided she has worn them occasionally. The wife cannot give or bequeath such paraphernalia during her husband's life, nor can her husband bequeath such paraphernalia so as to deprive her of them; but he can sell them or give them. The wife's paraphernalia are liable to the payment of the husband's debts, unless the articles were given to her by a stranger before marriage or after marriage; in such cases the articles are considered as gifts to the separate use of the wife, and are accordingly neither at the disposition of the husband nor liable to the claims of his creditors; but if such gifts are to be considered as the separate estate of the wife, they are not properly paraphernalia.

The widow is entitled to her paraphernalia in preference to any claim of legatees; and if specialty creditors of her husband have taken her paraphernalia for payment of their debts after the personal estate is exhausted, she has a right to reimburse herself out of the real estate which has descended to the heir.

The term paraphernalia is derived from the Greek *parapherna*, a term which the Roman lawyers adopted to express what in their own language could not be expressed by a single word, and which was expressed by the periphrasis of *peculium* or *extra dotem*. The parapherna comprised the things which the wife brought to the husband's house, and which were not part of her *dos*. The common practice at Rome was for the woman to make out a list of such things as she used, clothing, &c., which list was signed by the husband, as an acknowledgment of receiving them, or at least of receiving them into his house. This practice, derived from the Roman law, is still in use in some countries of Europe. The husband did not obtain the ownership of the things included in such list, and in case of a separation, they were restored to the wife: if they were not restored, she could recover them by an action framed according to the circumstances of the case. (*Dig.*, 23, tit. 3, s. 9.) It must be remembered that the Roman *dos* is a different thing from the English *dower*, though some English writers on law have confounded them. (Roper, *Law of Husband and Wife*, 'Paraphernalia.') [Marriage.]

PARAPHRASE (from the Greek παράφρασις). A paraphrase partakes of the nature both of a version, if the work paraphrased be in a foreign language, and of a commentary. Its object is to express the full sense contained in the words which are paraphrased, by the introduction of circumlocutions, explanatory clauses, and expansions of the author's meaning. A paraphrase, if well and honestly executed, is an excellent mode of giving a connected interpretation of a whole work. The faults to which this sort of commentary is most liable are an alteration of the author's sense, and a degree of weakness and tediousness resulting from the use of unnecessary words. The latter fault is very remarkable in Doddridge's excellent work 'The Family Expositor.'

PARAPLEGIA. [Paralysis.]

PARASANG (ὁ παρασάγγης), a Persian measure of length, which, according to Herodotus (ii. 6; v. 53; vi. 42), was equal to 30 stadia; and if we reckon eight stadia as equal to one English mile, the parasang was consequently equal to nearly four English miles. Hesychius and Suidas also give the length of the parasang at 30 stadia; and Xenophon must have calculated it at the same length, as he says (*Anab.*, ii. 2, s. 6) that 16,050 stadia are equal to 535 parasangs (16,050 ÷ 535 = 30). Pliny (*Hist. Nat.*, vi. 30) however informs us that the length of the parasang was reckoned differently by different authors; and Strabo states (xi., p. 518, Casaubon) that some reckoned it at 60, others at 40, and others at 30 stadia. The Arabic geographers (see Freytag, *Lex. Arab.*, sub Farsakh) reckon it equal to three miles; which agrees with the statements of English travellers (quoted by Rödiger, in Ersch and Gruber's *Encyclopädie*), who estimate it variously at from 3½ to 4 English miles. Franklin (*Tour to Persia*, p. 17) reckons it at 4 miles; Ouseley (*Travels*, vol. i., p. 23) at between 3½ and 3¾ miles; and Kinneir (*Geogr. of Persia*, p. 57) at 3½ miles.

Parasang is a Persian word, and is derived from the ancient farsang, which is pronounced in modern Persian, ferseng. It has been changed in Arabic into farsakh. Various etymologies of this word have been proposed. The latter part of the word is supposed to be the Persian *seng*, a stone, and the word might thus be derived from the stones which were placed to mark the distances in the road. Bohlen (quoted by Rödiger) supposes the first part of the word to be the preposition *fera*, and compares the word with the Latin *ad lapidem*.

PARASITICAL PLANTS are those which grow upon the living parts of other plants, from whose juices they derive their nutriment, a circumstance by which they are immediately distinguished from false parasites, or epiphytes, which merely fix themselves upon other plants without deriving food from them.

Parasitical plants, properly so called, are extremely numerous, and belong to various parts of the vegetable kingdom. Some attack their victims externally, others are insidiously introduced into the interior, where they flourish until they pierce through the skin, place themselves in communication with the open air, and disseminate themselves; hence, physiologists divide them into *intestinal* and *superficial*. The former are exclusively fungi, and appear under the forms to which the popular names of mildew, rust, brand, smut, &c. are applied; it is among the latter that parasites of so many different kinds are met with. These are again divisible into such as have true leaves, green, and capable of acting, in the manner of ordinary leaves, as organs of respiration and digestion; and such as have scales, brown or some colour not green, in the room of true leaves, without any powers of digestion or assimilation, except in a low degree. The first, or *leafy* or *green parasites*, elaborate their food for themselves; the second, or *scaly* or *brown parasites*, obtain it in a state of elaboration from other species.

Green leafy parasites belong exclusively, as far as is yet known, to the genera Viscum and Loranthus. The viscid seeds of these plants strike root upon any solid body on which they fall; if it is not suited to support them, as in the case of stones, rocks, or any inorganic substance, the seed soon perishes; but if it is capable of yielding them nutrition, as the leaf or branch of a tree, the young root immediately forms a kind of convex disk, which adheres firmly to the surface, and by degrees introduces itself into the interior so as to place itself in communication with the fluid contents of the plant on which it has germinated. In general it is a matter of indifference to such parasites to what plants they attach themselves: poplars, willows, apple and pear trees, elms, oaks, limes, spruce-firs, Scotch pines, vines, ashes, and many other trees, have all been seen attacked by the mistletoe, which, according to Pollini, has even been found upon the *Loranthus Europæus*, itself a parasite, and a similar case of double parasitism has been noticed in the Loranthus buxifolius attacked by Loranthus tetrandrus. In the opinion of De Candolle, this indifference as to the stock on which it grows is to be accounted for upon the supposition that such parasites are only in communication with the young wood, through which the crude sap, not very different in its nature in different trees, ascends, and whence it is in that state conveyed for the use of the parasite. The same author states, with reference to this point, that if a branch of mistletoe is plunged by the lower end into water, it pumps up only a minimum quantity, while, if the limb of the plant on which it grows is cut off and placed in water, the mistletoe causes the absorption of water, just as the leaves would of the plant itself. Such plants as these are sometimes very injurious to the trees they attack, bearing them down by their weight, and robbing them of the food intended for their own leaves and fruit. When this happens, abscission is the only known remedy, and if carefully followed up, it must be successful.

Brown scaly parasites always attack the roots of plants, and their underground habits have caused them to be little examined. The most common species in Europe are various kinds of *Orobanche*, which attack hemp, clover, lucern, and many other crops; *Monotropa* and *Lathræa*, which infest the roots, the first of the fir, and the second of the ash; in other countries Rhizanths abound [RHIZANTHS], and probably many others of which we have no sufficient knowledge. To these are usually added *Neottia Nidus Avis* and *Corallorhiza innata*, two orchidaceous plants, concerning whose real habits we have however no precise information. The best account of the manner of growth of brown parasites is by Mr. Bowman, who studied with care the habits of *Lathræa squamaria*. In that plant he found that the fibres of the roots are each tipped by a tubercle about as large as a pin's head, which tubercle attaches itself to the roots of the ash-tree, and gradually buries itself in the bark until it gets into communication with the wood, from which it derives its nutriment. One of the most remarkable peculiarities of such plants as these is the constant absence of all green colour, although exposed to the brightest light. Orobanches grow in pastures and open places, and yet their scale-like leaves indicate no visible tendency to any colour except brown or purple; and in Lathræa Mr. Bowman has shown that the same thing always happens, although the plants associated with it in its growth are as green as usual. Connected with this is another curious property, that of resisting the attraction of light, towards which all the green parts of plants irresistibly tend; in Lathræa, when the flower-stems have acquired their full stature, they are always perpendicular, and in groups of 20 or 30; in the most umbrageous situations the rows of flowers, which have always a unilateral direction, are as frequently turned from the only side on which light is admitted as towards it.

In addition to these superficial parasites there are numerous kinds of fungi which frequently commit great ravages among the plants on which they prey. *Rhizoctonia crocorum* seizes upon the bulbs of the saffron in the warmer parts of Europe, and spreading its long flexible arms around them, robs them by degrees of all their vital fluids. Many others have already been named in the article MILDEW.

(For detailed information concerning parasites, see Bowman, in the *Transactions of the Linnean Society*, vol. xvi., p. 399; and De Candolle's *Physiologie Végétale*, p. 1401.)

PARASYTES NAGEURS, M. Milne Edwards's name for a legion of his subclass *Crustacés Suceurs*. The Swimming Parasites consist of the orders *Siphonostomes* and the *Lerneans*. In the same subclass are placed the *Parasytes Marcheurs*, or Walking Parasites, consisting of the order *Araneiformes*. [SUCTORIAL CRUSTACEANS.]

PARCÆ (Μοῖραι), the Fates, were goddesses who were supposed to preside over the destinies of man. In Homer we only read of one deity, Μοῖρα or Αἶσα, whose decrees even the gods cannot escape; but in Hesiod and all succeeding poets we read of three Fates: Clotho (Κλωθώ), the 'Spinster;' Lachesis (Λαχέσις), the 'Distributor;' and Atropos ("Ατροπος), the 'Unchangeable.' In one passage Hesiod (*Theog.*, 904) calls them the daughters of Zeus and Themis; and in another (*Theog.*, 217), the daughters of Night, which agrees with the statement of Cicero (*De Nat. Deor.*, iii. 17), who makes them the daughters of Night and Darkness (Erebus). This contradiction seems to have arisen from the different notions entertained by the antients respecting the relative power of Zeus and the Fates, since they were sometimes represented as ruling the gods and Zeus himself, and at other times as merely carrying into effect the determinations of Zeus. In the antient Greek writers, and especially the tragic poets, the gods themselves are represented as subject to the decrees of fate; but in later times the Fates appear to have been generally regarded as subject to Zeus. Thus we learn from Pausanias (v. 15, s. 4; x. 24, s. 4) that Zeus was worshipped both at Olympia and Delphi under the name of Μοιραγέτης, or 'Leader of the Fates,' which title was also applied to Apollo at Delphi. (Paus., x. 24, s. 4.) Pausanias, in describing (i. 40, s. 3) a celebrated statue of Zeus at Megara, on the head of which the Fates (Μοῖραι) were placed, remarks that this was done because destiny (τὴν πεπρωμένην) is obedient to Zeus alone.

The Fates are usually spoken of by the Greek and Roman poets as spinning the destinies of men (*Il.*, xx. 128; *Od.*, vii. 197); and according to mythologists, each of the three presided over different periods of human life; Clotho over the beginning, Atropos the end, and Lachesis the general course of the life of each individual. Apuleius (*De Mundo*, p. 280, Bipont), whose opinion however can scarcely be regarded as representing the popular belief upon the subject, assigns a different office to each of the Fates. Atropos he regards as the fate of past time, Lachesis of future, and Clotho of present events.

There was a temple at Lacedæmon sacred to the Fates (Paus., iii. 11, s. 8), and there were also altars sacred to them in the neighbourhood of Sicyon. (Paus., ii. 11, s. 4.) They had also in later times a small temple at Rome in the eleventh district (regio) of the city (Onuphr. Panvin. apud Rosin., i., c. 13); but their worship seems to have prevailed at Rome to a very small extent.

PARCENERS, or COPARCENERS, are so called because the lands of which they are parceners may be partitioned or divided among them. There may be parceners by common law and parceners by custom.

As to parceners by common law, if a man dies intestate seised of lands in fee, and leaves only daughters, the lands will descend equally to all the daughters, or if he has no daughters and no brothers, the lands will descend equally to all his sisters, if he has any; and if there are no nearer heirs, the lands will descend to his aunts. The descent is the same if a man dies seised of lands in tail, except when the estate tail was limited to such man and the heirs of his body, for in that case the lands can only descend to those who are heirs of the body. In all cases where several females take one inheritance by descent, they are called parceners, and all lands or tenements, including a rent charge, may descend in this manner. If there be a title of dignity descendible to heirs of the body, the lands and tenements belonging to it may descend to parceners; but the dignity itself does not descend, for all the parceners only make heir, and a title of dignity is not in its nature divisible. The dignity therefore will be in abeyance. [BARON, p. 488.]

The descent of the crown is an exception to this rule; for if there are several daughters, &c., and no male heir, the crown with all its rights descends to the eldest female. In the case of the high constableship of England, if there were parceners, the office was executed by the husband of the eldest daughter, and, before her marriage, by deputy.

Parceners resemble joint tenants in having a unity of title and one entire freehold; but the unity of title can only be by descent, and there is no survivorship among parceners: if one of them dies, her heir is parcener with the survivor or survivors. Parceners resemble tenants in common, in having each a moiety or several interest in the land which has descended to them. It follows from the nature of this interest, that one parcener may either enfeoff another parcener of her share, or release her share to such parcener. A a parcener aliene her undivided share before partition, the alienee is tenant in common with the other parceners.

Parceners may voluntarily make partition of the land among them; or any one might formerly compel her coparceners to make such division by a writ entitled *de partitione facienda*, which was also applicable to the case of *joint tenants* and tenants in common. The Court of Chancery in course of time acquired a jurisdiction in these matters, and a bill may be filed in chancery by a parcener, praying for partition, which prayer will be granted on the parcener making out her title. The partition is effected by issuing a commission out of chancery to commissioners, who set out and divide the lands, upon which the parties execute mutual conveyances. When partition is made, the several parceners hold their lands as several and distinct estates. Since the abolition of the writ of partition (3 and 4 William IV., c. 27), partition can only be effected by a suit in equity.

Coparcenary may exist among males and females. For instance, if a man has two daughters, and one of them dies in his life-time, but leaving a son and daughters, and then the father dies, the son of the deceased daughter will be coparcener with his aunt; for he must trace his descent through his mother, who, if she had survived her father, would not have been his heir, but together with her sister, who did survive the father, would have made his heir.

By a recent act (3 & 4 Will. IV., c. 27, s. 12) it is declared that when a parcener has been in possession of more than her share of the land, or in the receipt of more than her share of the rent, held in coparcenary, for her own benefit or for the benefit of some other person than her coparceners, such possession or receipt by her shall not be considered the possession or receipt of her coparceners.

When all the sons take the land equally among them by descent, as in the case of gavelkind lands in Kent, they are parceners by custom.

Coparcenary is not very common at present, lands being generally so settled as to prevent its occurrence. The chief rules as to coparcenary are stated in Comyns's *Digest*, 'Parcenary,' and in Littleton, b. iii., 'Of Parceners.'

PARCHMENT is the skin of an animal prepared for writing upon. The name is a corruption of the Latin *Pergamena*, from Pergamus, the alleged place of its invention.

Parchment is ordinarily made of the skin of sheep or lambs. Peignot states that for drums it is made of goat or wolf skins, and that the parchment with which church-books are covered is made of pigs' skins. Vellum is a finer, smoother, and whiter sort of parchment, made of the skins of very young calves.

Whatever may be the kind of skin used, the process of manufacturing is the same. When the skin is divested of its hair or wool, it is placed for some time in a lime-pit, and then stretched on a square wooden frame drawn tight by pegs. When in the frame, it is first scraped on the flesh side with a blunt iron, then wetted with a moist rag, covered with powdered chalk, and rubbed well with pumice-stone; after a short pause, these operations are repeated, but without chalk; the skin is then turned and scraped on the hair side once only; the flesh side must now be scraped once more and again rubbed over with chalk, which must be brushed off with a piece of lambskin retaining the wool. All this is done by the skinner, who allows the skin to dry in the frame and then cuts it out and sends it to the parchment-maker, who repeats the operations with a sharper tool, using a bench stuffed with flocks to lay the skin upon instead of stretching it in a frame.

Parchment is said to have been invented by Eumenes II., king of Pergamus (who reigned B.C. 197-159), in consequence of the prohibition of the export of papyrus from Egypt by Ptolemy Epiphanes. The probability is, that some improvement was made in the manufacture at Pergamus, but Herodotus mentions writing on skins as common in his time, and Ctesias and Diodorus describe the antient Persian records as written on leather. The name Pergamena has been thought to prove its invention at that place, but the word was not used until several centuries after the time of Eumenes. Titus, a monk of the fourth century, is, according to Mabillon, the first writer in whose works it is found written. Previous to his time the usual term was membrana, which is the word we find in the Greek Testament, 2 Timothy, iv. 13.

The antient parchment must have been exceedingly fine, if we are to believe the story of Cicero's having seen the 'Iliad' written on this material enclosed in a nut-shell; but for this we have only Pliny's authority. (*Hist. Nat.*, vii., c. 21.) That of the seventh to the tenth century is white and good, and at the earliest of these periods it appears to have nearly superseded papyrus, which was brittle and more perishable. A very few books of the seventh century have leaves of parchment and papyrus mixed, that the former costly material might strengthen and support the friable paper. About the eleventh century it grew worse, and a dirty coloured parchment is evidence of a want of antiquity. This may possibly arise from the circumstance, that writers of this time prepared their own parchment, and they were probably not so skilful as manufacturers. A curious passage from a Sermon of Hildebert, archbishop of Tours, who was born in 1054, is a voucher for this fact. The Sermon is on the 'Book of Life,' which he recommends his hearers to obtain. 'Do you know what a writer does? He first cleanses his parchment from the grease, and takes off the principal part of the dirt; then he entirely rubs off the hair and fibres with pumice-stone; if he did not do so, the letters written upon it would not be good, nor would they last long. He then rules lines, that the writing may be straight. All these things you ought to do, if you wish to possess the book which I have been displaying to you.' (Sermon 15., Paris, 1708, fol.) At this time parchment was a very costly material; we find it mentioned that Guy, count of Nevers, having sent a valuable present of plate to the Chartreux of Paris, the unostentatious monks returned it with a request that he would send them parchment instead. It had long been customary to erase antient writing from parchment by rubbing it with pumice-stone. When the custom began we do not know; Muratori cites a palimpsest of theirs nearly nine centuries old, and some have since been found of still more antient date. [Palimpsest; Gaius.] The practice was so common in the fourteenth and fifteenth centuries, that when the emperor of Germany empowered the creation of an imperial notary, one of the chief articles of his diploma was that he should not use scraped vellum in drawing deeds. But the invention of linen paper came in aid to the uses of parchment, and when its manufacture became cheap, it superseded the more costly article for all purposes except those in which luxury was aimed at or uncommon durability required.

PARDALOTUS. [Pipridae.]

PARDON. According to the laws of most countries, a power of pardoning, or remitting the penal consequences of a conviction for crimes before the judicial tribunals, is vested in the sovereign or in the chief magistrate. The utility of such a power has been doubted by juridical writers, upon the ground that it supposes an imperfect system of criminal law, and that every instance of its exercise is the proclamation of an error either in the law itself or in the administration of justice. (Beccaria, chap. 46.) There is no doubt that the nearer a penal system approaches to perfection, the fewer will be the occasions for resorting to extrajudicial remissions of the execution of the law; but considering the numerous causes of erroneous decision, arising not only from the imperfection of laws themselves, but from the infinite sources of error in the instruments and means by which they are administered, it seems to be desirable that some power should exist which may by timely interference prevent the occurrence of irremediable wrong in cases where the error cannot be corrected by any appellate tribunal. At the same time it is evident that such a power should be circumscribed and defined, as far as its nature will admit, and exercised with the utmost caution. By the law of England, besides pardons by act of parliament, the power of granting pardons for crimes is exclusively vested in the king as a branch of his prerogative. [Prerogative.]

Formerly, Counts Palatine, Lords Marchers, and others who claimed *jura regalia* by virtue of antient grants from the crown, assumed the authority to pardon crimes; but by the stat. 27 Henry VIII., c. 24, this power was entirely abolished, and the sole right of remitting the sentence of the laws was permanently vested in the king. The power of pardoning is applicable in all cases in which the crown is either concerned in interest or prosecutes for the public. The only exception to this rule is contained in the Habeas Corpus Act (31 Car. II., c. 2, s. 12), by which persons convicted of signing commitments of British subjects to foreign prisons are declared to incur the penalties of a praemunire and to be 'incapable of any pardon from the crown.'

The crown has however no power to pardon any offence in the prosecution of which a subject has a legal interest, or, as Bracton expresses it, 'non potest rex gratiam facere cum injuriâ et damno aliorum' (lib. iii., p. 132). Thus in appeals of death, robbery, or rape, the king could not pardon the defendant, 'because,' says Sir Edward Coke, 'it is the suit of the party to have revenge by death' (3 *Inst.*, 237). Upon the same principle, where an attaint was brought against a jury who had delivered a false verdict, and the party in whose favour it had been given was joined in the attaint, the king might pardon the *jury*, if convicted, because they were merely subject to an exemplary punishment; but he could not pardon the *party*, because the latter was liable to make restitution to the plaintiff who prosecuted the attaint. So also in indictments for common nuisances, where the public are interested as individuals or particular classes, or informations upon penal statutes, where the penalty or any part of it goes to the informer, or the party grieved, the crown cannot pardon the offender. Formerly, the crown appears to have exercised without restriction the power of pardoning offenders impeached by the Commons in parliament (Blackstone's *Commentaries*, vol. iv., p. 400—Christian's *Note*); but the lawfulness of the exercise of this power during the pendency of the proceedings was questioned by the House of Commons on the impeachment of the Earl of Danby in the reign of Charles II. (Howell's *State Trials*, vol. ii., p. 724); and by the Act of Settlement, 12 and 13 William III., c. 2, it was enacted 'that no pardon under the great seal of England shall be *pleadable* to an impeachment by the Commons in Parliament.' This statute however does not affect the power of the crown to pardon the offender after he has been found guilty upon the impeachment, and the proceedings are determined.

An effectual pardon from the crown must apply in express terms to the particular offences intended to be pardoned; and there must be no reasonable intendment, supplied by the recital in the pardon or otherwise, that the crown was deceived or misled as to any of the circumstances on which the grant was founded. Nor can any grant of a commission or protection by the king amount by implication to a pardon of any offence previously committed.

A pardon may be either absolute or subject to any condition which the crown may think proper to annex to it; and in the latter case, the validity of the pardon will depend upon the performance of the condition. Until the recent improvements in the criminal law of England, almost all felonies were nominally capital; and in the numerous cases where it was not intended that the sentence of death should be executed, the criminal obtained a pardon upon condition of his submitting to transportation or some other punishment. At the present day, where the crown interferes to mitigate or commute a sentence, the mode by which it is effected is by granting a conditional pardon.

It was formerly necesssary that every available pardon from the crown should be under the great seal; but by the stat. 7 and 8 Geo. IV., c. 28, s. 13, it is declared and enacted 'that where the king's majesty shall be pleased to extend his royal mercy to any offender convicted of any felony, punishable with death or otherwise, and by warrant under his royal sign manual, countersigned by one of his principal secretaries of state, shall grant to such offender either a free or conditional pardon, the discharge of such offender in the case of a free pardon, and the performance of the condition in the case of a conditional pardon, shall have the effect of a pardon under the great seal.'

The effect of a pardon is not merely to prevent the infliction of the punishment denounced by the sentence upon the offender, but to give him a new capacity, credit, and character. A man attainted of felony ceases to be *probus et legalis homo*, and can neither bring an action for damages nor be a witness or a juror in any legal proceeding; but upon receiving a pardon, all these legal disabilities are removed. In this respect a pardon by the law of England differs from the abolitio of the Roman law, to which in other points it bears a near resemblance. According to the latter, 'Indulgentia, quos liberat, notat; nec infamiam criminis tollit, sed pœnæ gratiam facit.' (*Cod.*, lib. ix., tit. 43.) By the English law a distinction is made as to the effect of a pardon where the incapacity is part of the legal sentence, and not merely a consequence of attainder, as in the case of perjury under the statute 5 Elizabeth, c. 9; where the incapacity or infamy is part of a statutory sentence, a pardon from the crown has been held not to restore the party, and in such a case nothing less than an act of parliament will have that effect. (Chitty's *Criminal Law*, vol. i., p. 776.) Some doubt has been expressed, and the point has not yet received a judicial determination, whether a royal pardon will fully restore a person convicted of a crime, such as perjury, which is considered infamous at the common law. This subject is elaborately discussed, and all the authorities carefully examined in Mr. Hargrave's 'Argument on the Effect of the King's Pardon of Perjury' (Hargrave's *Juridical Arguments*, vol. ii., p. 221).

PARE′, AMBROSE, the first and most eminent of the old French surgeons, was born in 1509, at Laval, in the province of Maine and the modern department of Mayenne. His parents were poor, and his education was neglected, but having one day witnessed the operation of lithotomy, he went immediately to Paris and commenced the study of surgery. He afterwards accompanied the French army during several campaigns in Italy, and gained so much reputation, that in 1552 he was appointed surgeon in ordinary to king Henry II. He held the same office under Francis II., Charles IX., and Henry III., until his death, at the age of eighty-one, in 1590. He appears to have been a pious and excellent man, and having been educated in the reformed church, he steadily refused to leave it. During the horrible massacre of St. Bartholomew's, he owed his life to his professional reputation and the personal friendship of the king, whom, as he tells us himself, he had especially obliged by having saved from the consequences of a wound accidentally inflicted on the median nerve in venesection. (*Opera Chirurg.*, lib. ix., cap. 38.) Brantome says, in his 'Memoirs,' that on the evening of the massacre the king sent for him into his bed-room, and told him not to stir out, saying that it was not right to murder a man who was so useful to the world (tom. iv.). The French writers justly consider Paré to be the father of modern surgery, and say that he holds the same rank in this branch of the profession as Hippocrates does in medicine. He was not satisfied with blindly following the precepts of his predecessors, but by diligent observation and reflection made several important changes in the mode of treatment, which have been followed to the present day. One of his greatest reforms was in the treatment of gun-shot wounds, into which it was the custom at that time to pour boiling oil; he was also the first person who left off the barbarous practice of cauterising a limb to stop the hæmorrhage after an amputation. He was the first who recommended the extraction of the fœtus by the feet in cases of difficult parturition (lib. xxiii., cap. 26). He says that in cases of ascites the fluid should *not* be drawn off all at once after paracentesis (lib. vii., cap. 12). Although he was not the discoverer of the art of tying the blood-vessels, he at least restored the practice, pointed out its advantages, and gave some excellent rules for performing the operation. His works are chiefly valuable and remarkable for the great number of facts and cases contained in them, and for the care with which he avoids giving any directions resting merely upon theories and unsupported by observations. They were published in a collected form at Paris, 1585, fol., in French, and are divided into twenty-eight books, of which the first five are chiefly on anatomical and physiological subjects. There are several other editions of his whole works, which have also been translated into Latin, Paris, 1582, fol., in twenty-six books; into English, London, 1578, fol.; into Dutch, Leid., 1604, fol.; and into German, Frankf., 1601, fol. (Sprengel, *Hist. de la Méd.*; Haller, *Biblioth. Chirurg.*; *Biogr. Méd.*)

PARE′DES, DIEGO GARCIA DE, a celebrated Spanish general, not undeservedly called 'the Spanish Bayard,' was born of noble parents, at Truxillo, a town of Estremadura, in 1466. Having early embraced the career of arms, he accompanied his father to the war of Granada (1485), and was present at the taking of Baza, Velez, and Malaga from the Moors. [Ferdinand; Moors.] It was there that he became acquainted with the celebrated Gonzalo de Cordova, under whom he afterwards served in Italy. Shortly after the taking of Granada (1492), which put an end to the Moorish war, Paredes, who had retired to his native town, determined to repair to Italy, then the theatre of war; but as he had neither horse nor armour, he stole those of a cousin of his, and secretly left his father's house. Scarcely however had he proceeded a few miles on his way, when he was overtaken and attacked by seven of his cousin's squires, of whom he killed two.

wounded two more, and put the remainder to flight. On arriving at Rome, he was well received by the Pope (Alexander VI.), who gave him a high command in his army. He served that pontiff with great zeal until 1499, when he left his service and enlisted under the banners of the Great Captain, who with a powerful fleet sailed towards the Morea. He was present at the taking of Cephalonia from the Turks (June, 1501), and was made prisoner in a sortie of the garrison, but he soon succeeded in extricating himself from the hands of the enemy. War having broken out (July, 1502) between the French and the Spaniards, who contended for the possession of the kingdom of Naples (Ferdinand V.; Louis XII.), Paredes rendered most important services by his military skill and his undaunted courage. At the celebrated pass of arms of Trani, he was one of the eleven Spanish champions who entered the lists, and, though enfeebled by the wounds he had received on a former occasion, he alone unhorsed three of the antagonists. At the storming of Ruvo (February, 1503) he led the scaling party, and was the first on the ramparts. He also distinguished himself at Cerignola, where he commanded the centre of the Spanish army, and signalized himself by defending alone on the bridge against a body of French knights, all completely armed, and contending successfully with them, until he was rescued by a party of his own men. According to Mariana (book ii, lib. 29, cap. 4), Paredes, having been, shortly after the death of the Great Captain (December, 1515), deprived of his estates by the restoration made to the Angevin lords, endeavoured to repair his broken fortunes by driving the trade of a corsair in the Levant. However this may be, Paredes continued to serve in Italy. He was present at the sieges of Verona and Vicenza, and also at the celebrated battle of Pavia (1525), where Francis I. was taken prisoner. [CHARLES V.]

Paredes died in 1530, at the age of 64. He always lived in great intimacy with Gonsalvo, whose brilliant qualities he appreciated, being one of his most zealous supporters when he fell into disgrace. Having one day, while in the presence of Ferdinand, overheard two noblemen speak slightly of his general, Paredes threw his gauntlet on a table, and said, 'Whosoever asserts that the Great Captain is not the king's best vassal, let him pick up this.'

Paredes wrote a short but highly interesting account of his own military campaigns and exploits, which is printed at the end of the 'Cronica del Gran Capitan.'

(Paulo Jovio, *Vitæ Illust. Virorum*, Basil. 1578; Guicciardini, *Istoria d'Italia*, vol. i., lib. 6; *Chronica del Gran Capitan*, Alcalá, 1584; Zurita, *Anales del Reyno de Aragon*, vol. iv.; Quintana, *Españoles Célebres*, vol. i.)

PAREIRA, a Portuguese name given in Brazil to the roots of certain plants employed in medical practice as valuable tonics and diuretics. The sort which is admitted into the Pharmacopœias of Great Britain is called Pareira brava, a climbing plant, with orbicular peltate leaves, small green racemose panicles of flowers, and scarlet hairy berries. It inhabits the West India Islands, in some of which it is known by the name of Velvet-leaf, as well as on the mainland of America, and is the *Cissampelos Pareira* of Linnæus. It is frequently administered in this country, especially in dyspeptic cases and in chronic inflammation of the bladder. Other kinds peculiar to the woods of Brazil are the *Cissampelos glaberrima* and *ovalifolia*, the properties of which appear to be altogether the same as those of the true Pareira. Besides these there is a white Pareira, found in Guzerat and the neighbouring countries, which is furnished by the genus Abuta, and which is principally employed as a diuretic. (Lindley's *Flora Medica*, Nos. 770 to 774.)

PAREJA, JUAN DE, born in 1610, is remarkable not only for an extraordinary love of the art of painting, but for having acquired a great degree of excellence while in a low and abject condition of life. He was a mestizo, that is, born in the West Indies, and the son of a Spanish father by an Indian woman; he became a slave of the celebrated Velasquez, who employed him in grinding colours.

He spent whole nights in drawing, and almost denied himself rest and sleep, imitating, as may be supposed, the manner of Velasquez. He was however under perpetual fear of being discovered by his master; till at length he hit on an ingenious mode of disclosing his secret. Having observed that Philip, king of Spain, who frequently honoured Velasquez by visiting him, always ordered any paintings which were placed with their face to the wall, to be turned, Pareja placed a picture of his own in that position; the king, as he expected, ordered it to be turned. He expressed his admiration of it to Velasquez, who however was taken by surprise, and declared that he knew nothing of it. On this Pareja fell on his knees, and begged the king to obtain his pardon of his master for having presumed to practise the art without his permission. Philip, being much pleased at this address and admiring a work produced under such singular circumstances, told Velasquez that a man who showed so fine a genius and possessed such talents ought no longer to be a slave. Velasquez, of course, immediately emancipated him. But he never quitted his master, and after the death of Velasquez continued to serve his daughter with the most grateful fidelity.

He was especially successful in painting portraits, which in style, colouring, and handling so exactly resembled the works of his master, that we are assured they could not be distinguished from them.

PARELLA (sometimes written *Perelle*), the French name of a crustaceous Lichen, *Lecanora Parella* of botanists, but which is applied to several species similar to it in habit, and employed for the same purpose, that is, for yielding a rich dye known by the name of litmus. The mode of preparing this is not well known, but it is probable that it is similar to that employed in the manufacture of Orchil. By French authors it is described as consisting in macerating the lichen for ten or twelve days in urine, with the addition of lime-water, when it acquires a violet colour and is changed into a soft pulp; it is then strained in a coarse cloth, and moulded into pellets, as seen in commerce. M. Guibourt is of opinion that the colouring matter is given by *Crozophora tinctoria*, or turnsol; this may be the case sometimes, but there can be no doubt that not only the parella but several other species of lichen are collected, and if not for this, for what other purpose do they form articles of commerce? In France even, several other species are employed, as well as the parella, which is especially called parelle d'Auvergne. The inhabitants of that province scrape the rocks for this lichen, which is said to be often intermixed with *Lichen* (now *Isidium*) *corallinum*, which is endowed with similar properties. De Candolle indeed states that most of the lichens with a crustaceous thallus are possessed of dyeing properties, and therefore it is probable, as stated by Guibourt, on the authority of Ramond, that with the above, *Variolaria orcina*, *dealbata*, and *aspergilla*, with *Lichen geographicus*, *scruposus*, and *sulphureus*, are employed in preparing litmus. We know indeed that in Great Britain several species have been used for yielding colouring matter. *Parella omphalodes* and *P. saxatilis*, for instance, used to form articles of commerce in the west of Scotland, being much used by the peasants for dyeing their woollen cloths of a dull brown colour. *P. tartarea* has been long employed, both by the Scotch and Welsh, also for dyeing woollens. It was brought into extensive employment by Dr. Cuthbert Gordon, who took out a patent for his process, converted his Christian name into Cudbear, and applied it to the dye-stuff employed to produce purple for dyeing woollen yarn. The parella and its best substitutes continue in great request, and bring higher prices than ever, from their increased scarcity.

PARENCHY'MA is the term which was applied by the old anatomists to an imaginary substance, through which they supposed the blood at the ends of the veins to be strained. Even after the discovery of the circulation, the mode in which the blood passes from the extremities of the arteries to the beginnings of the veins remained for some time unknown. Harvey seems to have hesitated between the hypothesis of the writers just preceding him, who believed that there were wide passages of communication between arteries and veins, and that of the more ancient authors, who spoke of a parenchyma, or spongy substance, a concrete blood which they supposed to lie between the vessels, and to constitute the chief mass of all the organs of the body. The discovery of the passage of the blood from arteries to veins through the minute capillary vessels was made by Malpighi, in 1661, by a microscopic examination of the circulation of a frog; and it afforded the only proof that was needed to render Harvey's demonstration of the circular motion of the blood perfect.

In the present day the term parenchyma is rarely used. If it has any definite meaning at all, it may be considered to express all that part of an organ, and especially of a gland, which lies in the interspaces of the blood-vessels and lytween the secreting ducts, that is, the common cellular tissue by which the more essential parts of organs are connected together.

PARENT AND CHILD. This relation arises only from a legal marriage. The relation between parents and their illegitimate children is considered in the article **Bastard**.

Parents are bound to maintain their legitimate children who are unable to maintain themselves owing to infancy or inability to work. This obligation extends to father and mother, grandfather and grandmother, if they are able to perform it (43 Eliz., c. 2). But such persons are only bound to furnish the children with the necessaries of life; and the penalty incurred in case of refusal is only 20*s.* per month. A husband is now (4 and 5 Wm. IV., c. 76) liable to maintain the children of his wife, born before marriage, whether they are legitimate or not, until they are of the age of sixteen, or until the death of his wife. If a parent deserts his children, the churchwardens and overseers may seize his goods and chattels, and receive his rents, to the amount mentioned in the justices' warrant, which must be obtained before such seizure is made.

If a Popish parent refuse to allow his Protestant child a suitable maintenance, with the view of compelling him to come over to the Roman Catholic religion, the lord chancellor is empowered to order the parent to make a proper allowance (11 and 12 Wm. III., c. 4); and if Jewish parents refuse to allow their Protestant children a maintenance suitable to the parent's fortune and the age and education of the children, the lord chancellor, on complaint being made, may make such order as he shall think proper (1 Anne, st. i., c. 30).

Parents are not bound to make any provision for their children after their death. Every man, and every woman who is capable of disposing of her property by will, may dispose of it as they please; except a freeman of London, who is under some limitations as to the power of disposing of his personalty by will, which limitations are in favour of his wife and children. A parent or child may aid each other in a law suit by paying fees, without being guilty of maintenance, if they have no expectation of repayment.

Parents are not legally bound to give any education to their children, nor are they under any restrictions as to the kind of education which they may give. Certain penalties were imposed by statute (1 Jac. I., c. 4; 3 Jac. I., c. 5) on a person who sent a child under his government beyond seas, either to prevent his good education in England or for the purpose of placing him in a Popish college or being instructed in the Popish religion; and further penalties and disabilities were imposed both on the person sending and the person sent, by the 3 Car. I., c. 2. It seems that it was intended to repeal these penal and disabling statutes by the 31 Geo. III., c. 32, in favour of any Roman Catholic who took the oath therein prescribed; and probably these statutes may be considered as repealed.

The power of a parent over his children continues until the age of twenty-one, when they are emancipated; and if a parent die leaving a child under age, he may appoint a guardian to such child till the age of twenty-one, by a will executed pursuant to 1 Vic., c. 26. A mother has no power over her children. A person under age, except a widower or widow, cannot marry without the father's consent, or such consent as is required by the Marriage Act. [**Marriage**, p. 441.]

A child under age may acquire property by gift; and if a father is the trustee of his child's estate, he must account to the child when he comes of age, like any other trustee. So long as a child who is under age lives with and is supported by the father, the father is entitled to receive the reward of the child's labour. When a child has a fortune of his own, and the father is not able to maintain him suitably to such fortune, a court of equity will allow the father a competent sum for maintenance out of the child's estate; but a father is not entitled to any such allowance in respect of costs incurred by him for his child's maintenance before he obtains such order of court for maintenance.

A parent may maintain an action for the seduction of a daughter on the ground of loss of her services, if there is evidence of her acting in the capacity of servant, or living with the parent in such a manner that the parent had a right to her services. This action has been maintained by a father in the case of his daughter, a married woman above age, living separate from her husband, and with the father; and by an aunt for the seduction of a niece living with her, to whom she stood in the relation of parent. The foundation of the right to maintain such an action is the loss of the services to which the parent is entitled. In allowing such an action therefore in the case of a child above age or a married woman, the courts have departed from the legal principle which is the foundation of the right of action.

A father is legally entitled to the care and custody of his children, but he may be deprived of the care of them by the court of chancery, if his conduct is such as, in the opinion of the court, endangers the morals of the children. Percy Bysshe Shelley was, among other things, restrained by an order of the court of chancery from taking possession of the persons of his infant children, on the ground of his professing irreligious and immoral principles and acting on them. W. P. T. L. Wellesley was also restrained by a like order from removing his children from the care and custody of their aunts, on the ground of his immoral conduct, and directions were given by the court for the custody and education of the children. But, except in such cases as these, the children cannot be taken from the care of the father and given into the custody of the mother or any other person.

Under a recent act (2 and 3 Vic., c. 54) a mother who is living apart from her husband may obtain by petition an order from a court of equity for access to her child while in the sole custody of the father, or of any person by his authority, or of any guardian after the death of the father, subject to such regulations as the judge may think convenient and just; and if such child shall be within the age of seven years, the judge may order the child to be delivered into the custody of the mother until the child attains the age of seven years, subject to such regulations as aforesaid. But no mother is to have the benefit of the act against whom adultery has been established by judgment in an action at law, or by the sentence of an ecclesiastical court.

The relations between parent and child which are not founded upon the parental power, but arise in respect of gifts by the parent to the child on marriage or any other occasion, and in respect of purchases by the parent in the name of the child, belong to various heads or titles of the law of property, inasmuch as the rights and claims of other persons besides parent and child are involved in such cases.

A child who is under the parental power owes obedience to his parent, which the parent may enforce by his superior strength, provided he uses it with moderation. He may beat his child and restrain his liberty, but not in such a way as to injure his health. A child is legally bound to maintain his indigent father and grandfather, mother and grandmother, if he is able; the penalty in case of refusal is 20*s.* per month.

The Paternal Power (patria potestas) among the Romans was a peculiar feature in their institutions. It was founded on a legal marriage, or on a legal adoption: the children of such marriage and such adopted children were in the power of the father; the mother had no power over the children. It followed from the principle of the patria potestas, which involved a right of property, that the children of a son, not emancipated, were also in the power of their grandfather. By the death of the grandfather the son became *sui juris*, and his children and grandchildren fell into his power. The patria potestas could also be dissolved by **Emancipation**. Originally the father's power was absolute over the child, who had no independent political existence, at least as a member of his father's family. He was a Roman citizen, but at home he was subject to the domestic tribunal. Within the family the father had a power of life and death, and could sell the son as a res mancipi, either by way of punishment, or by way of dissolving the family connexion. [**Emancipation**.] The father also originally possessed the jus noxae dandi with respect to his son as well as a slave, a power which was a consequence of the principle of the father being answerable for the delicts of his son, and continued as long as that principle was in full vigour. The son who was in the power of his father could acquire no property for himself; all his acquisitions, like those of a slave, belonged to his father; but at the death of the father they might become his own property, a circumstance which distinguished the acquisitions of a son from those of a slave. The father could marry his children, divorce them, them in adoption, and emancipate them at pleasure.

The strict notion of the patria potestas lies at the foundation of the Roman polity. Like other institutions however, which in the early history of a state form its essential element, the strict character of the patria potestas became gradually relaxed and greatly changed. The history of such changes is a part of the history of Rome.

The patria potestas might be dissolved in other ways besides those mentioned. If a father or son lost his citizenship, the relation between them ceased, for this relationship could only exist between Roman citizens. If father or son was made a prisoner by an enemy, the relation was in abeyance (in suspenso), but was not extinct. If the son attained certain high offices in the state, either civil or religious, the patria potestas was thereupon dissolved.

(Gaius, i. 55, 97, 127, &c.; Marezoll, *Lehrbuch der Institutionen des Röm. Rechtes*, 1839; Savigny, *System des heutigen Röm. Rechts*, 1840.)

PARGA, a town in the province of Albania in European Turkey, on the coast of the Ionian Sea, opposite to the Isle of Paxo, from which it is 12 miles distant, in 39° 17′ N. lat. and 20° 19′ E. long. This place is first mentioned in the fourteenth century, when, amidst the wreck of the Eastern empire, the inhabitants of Parga sought safety in the protection of Venice, and became voluntary subjects of that republic. A nobleman of Corfu, under the title of governor, resided at Parga, subject to the Venetian governor-general at Corfu, and commanded the garrison, which consisted of a company of Sclavonian or Italian troops, in the pay of Venice. The Parguinotes however had their own municipal council, which appointed the magistrates, and they enjoyed several other privileges. They were all armed, and were frequently at war with their neighbours. This state of things lasted till the fall of Venice, in 1797, when, in the partition of the Venetian territories between France and Austria, France got for herself the Ionian Islands and the Venetian settlements on the coast of Epirus. These settlements were Butrinto, Parga, Prevesa, and Vonitza in the Ambracian Gulf. They had each a small territory, which was guaranteed from Turkish intrusion by treaties between the Porte and Venice. The French, having taken possession of the Ionian Islands, sent small garrisons to each of these towns to replace the Venetian garrisons. But the invasion of Egypt by Bonaparte, in time of profound peace with the Porte, threw the latter into the coalition then forming against France; and a treaty was concluded in December, 1798, between Russia and Turkey, by which the two powers agreed to join their forces by sea and by land against the common enemy. The Turco-Russian fleet and army accordingly attacked the Ionian Islands, and took them from the French, and at the same time Ali Pasha of Epirus attacked the French garrison of Prevesa, and massacred it with circumstances of great atrocity. He likewise invaded Butrinto and Vonitza, from which the French had withdrawn, as well as from Parga. Parga however was strong by nature, and the inhabitants, being summoned by Ali to surrender, boldly refused. In March, 1800, a convention was agreed upon between Russia and Turkey, by which the Ionian Islands were constituted a republic, under the suzerainty of the Porte and the guarantee of Russia. By article viii., of the same convention it was stipulated that 'the former Venetian possessions of Butrinto, Prevesa, Parga, and Vonitza, which are on the continent and contiguous to Albania, shall belong in future to the Porte, and the inhabitants of these places be governed by a Turkish commandant, paying however no more tribute than they used to pay to Venice; the inhabitants shall continue to be administered according to their own laws and customs, shall retain the free exercise of their religion, and no Mussulman shall acquire property or reside amongst them, with the exception of the commandant.' By article ix. of the same convention the emperor of Russia promised to use his endeavours, in the event of a general peace, to cause the stipulations of the present treaty to be accepted by the other powers. (Martens, *Recueil de Traités*, vol. vii.) To the unfortunate surviving people of Butrinto, Prevesa, and Vonitza, who were already in the grasp of Ali Pasha, who had treated them with great cruelty, this convention was a boon, by giving them a claim to some sort of protection. Parga however was still free, and the inhabitants for a time refused to submit, but being threatened with imminent destruction from the numerous forces of Ali Pasha, they sent a deputy to Constantinople to request the protection of the Porte, and through the influence of the minister of the republic of the Ionian Islands, supported by Russian influence, the divan sent them a bey to reside among them, thus fulfilling the stipulations of the treaty, and at the same time protecting them against any encroachments from Ali. Parga remained in this state of nominal subjection to the Porte till 1806, when war broke out between Russia and the Porte. Ali Pasha took this opportunity of taking military possession of Prevesa, Butrinto, and Vonitza, and dealing with the inhabitants as he pleased, against the stipulations of the convention of 1800. Those of Parga, fearing the same fate, applied for protection to the Russian admiral on that station, who sent them a garrison.

By the treaty of Tilsit, in 1807, the Ionian Islands being given up to France, the Russian troops which were stationed in them withdrew, including the detachment at Parga. Ali Pasha now renewed his efforts to take possession of Parga, and applied to the French governor-general at Corfu for the formal cession of that place. That officer however refused, and sent a garrison to Parga. In 1814, the English, having already driven the French out of the Ionian Islands, with the exception of Corfu, and placed a garrison in the island of Paxo, which lies in sight of Parga, Ali Pasha sent a considerable force against Parga, which invaded its territory, took some villages, and murdered or carried away the inhabitants, but the Parguinotes sallied out of their town, repulsed the Turks, and killed the bey, who was a nephew of Ali. The French garrison remained within the citadel, and did not take part in the action. The Parguinotes, seeing that they could no longer rely on the protection of France, applied to the English at Paxo, in March, 1814, and offered to hoist the English flag, and master the French garrison, if the English would take them under their protection. General Campbell, who commanded in the Ionian Islands, sent a detachment with two frigates, and the Parguinotes having surprised the citadel and hoisted the English flag, the detachment was landed, and took possession of the fortress on the 22nd of March, and the French garrison was sent to Corfu. (Colonel de Bosset, *Proceedings in Parga, with a Series of Correspondence and other Documents.*)

The future condition of the Ionian Islands remained to be settled by the great powers assembled at the congress of Vienna. A convention, agreed upon between the courts of Russia, Prussia, Austria, and Great Britain was signed at Paris on the 5th of November, 1815, by which the isles of Corfu, Zante, Cefalonia, Santa Maura, Ithaca, Cerigo, and Paxo, with their dependencies, 'as designated in the treaty between his majesty the emperor of all the Russias and the Ottoman Porte, concluded on the 21st of March, 1800,' were to form an independent state under the protection of the crown of Great Britain. By article viii. of the same convention the Ottoman Porte was invited to accede to its stipulations. The Porte, being applied to, demanded as a preliminary step, the fulfilment of the treaty of March, 1800, by the formal cession of Parga. After some lapse of time, an agreement was entered into at Constantinople between the English minister and the divan early in 1817, for the delivery of Parga to the Porte, under the condition that those inhabitants who might choose to emigrate should have an asylum in the Ionian Islands, and their immoveable property be valued and paid for by the Porte previous to their embarkation. Joint commissioners were appointed, one by the English and the other by Ali Pasha, for the purpose of making the valuation. This arrangement was formally announced to the Parguinotes by a proclamation, dated 20th May, 1817. The primates and other inhabitants declared that all would leave the place rather than trust themselves to the Turks.

The population of Parga at the time was stated by the English commandant, Colonel de Bosset, at 800 families, making 5000 individuals in all. The olive-trees belonging to them amounted to about 81,000. The landed property and houses were roughly estimated by Col. de Bosset at between 450,000*l.* and 500,000*l.* The proceedings for the estimation and payment of the property were protracted for nearly two years through the cavils of the Turkish commissioner, and the intrigues of Ali Pasha, who wished to obtain Parga without paying the money. Ali tried all means to excite the inhabitants of Parga to acts of violence, by which they might forfeit the English protection, but the good sense of the Parguinotes and the steadiness of the British authorities disappointed his cunning. At last, in May, 1819, the whole population of Parga emibarked in English vessels, having received the valued amount of their property, 150,000*l*., and were settled at Paxo and Corfu. The Turks then occupied Parga. (*Letter from a Grecian Traveller respecting the intended Cession of Parga*, London, 1819.)

The cession of Parga has been treated by several writers as a question of feeling rather than one of strict diplomacy, and has been made on the Continent the topic of much declamation against England, both in prose and in verse. That cession however was a direct consequence of the treaty of March, 1800, in which England had taken no part, which treaty was the result of two unprincipled acts of aggression by Bonaparte, the first against Venice, and the second upon Egypt. In politics, as in private morality, one act of injustice is often the leader of a long train of woful results. A liberal Italian writer, Count Pecchio, in his 'Life of Foscolo,' ch. x., frankly acknowledges that the cession of Parga was obligatory upon the English in fulfilment of former treaties, and that they did everything they could to mitigate its hardships upon the inhabitants, considering that they had to deal with such a man as Ali Pasha; and Foscolo, by birth a Greek, after writing a big book on the subject, perceived his mistake just in time to stop its circulation.

The town of Parga stands on a rock forming a small peninsula. It has two ports, one of them antiently called γλυκὺς λιμὴν, 'the port of sweet waters,' now Port Veliki. The town is walled and has narrow streets. The citadel on the summit of the rock is almost impregnable. It is surrounded by a fertile territory, and the townsmen export oil, tobacco, fruit, and tolerably good wine.

PARHE'LION (παρά, by the side of, ἥλιος, the sun), a name given to the mock suns, as they have been called, which sometimes appear near the sun; being, as is supposed, images of the latter formed by reflection from a cloud.

PARIA, THE GULF OF, extends between the island of Trinidad and the continent of South America, and has received its name from the adjacent portion of the continent, which was once called Paria, a name afterwards superseded by that of Cumana. The gulf extends about a hundred miles, from 61° 30′ to 63° W. long. It has nearly the form of a quadrangle, whose longest side lies east-north-east by east and west-south-west by west, and is about 30 miles across.

A hilly promontory, projecting from the continent of South America more than 70 miles, separates the gulf from the Caribbean Sea, and terminates on the east with Cape Punta de la Peña, which is also called Cape Paria. Opposite this cape and about 20 miles from it is the most north-western point of the island of Trinidad. This opening contains four straits formed by three rocky intervening islands. The most western of these straits, called Boca de Dragon (Dragon's Mouth), is the widest, and about 6 miles across. There are several rocky islands in it towards the Punta de la Peña, but as all of them are above the water, they are easily avoided. The rocky island east of it is called Chacachacares. Between it and the Isla de Huevos (Isle of Eggs) is the second strait, called Ship Channel, which is only two miles wide. This channel, which bends south-eastward, is used by vessels leaving the gulf, but not generally by those that enter it, as the current sets outward and is strong. Between the Isla de Huevos and the Isla de Monos (Isle of Apes) is the Huevo Channel, which is somewhat wider than the preceding, and is more used by vessels entering than leaving the gulf. The Monos Channel, between the Isla de Monos and the north-western point of Trinidad, is the narrowest, and the current in it is the strongest. It is only navigated by small vessels. As the current runs through all these straits northward, the gulf can only be entered with a strong breeze.

The southern entry of the gulf is between the rocky cape called Punta Icacos, in the island of Trinidad, and the low alluvial shores lying on both sides of the two most western of the mouths of the Orinoco, called Cano de Pedernales and Cano de Manamo Grande. From these low shores a shoal extends nearly across the strait, which is called the Serpent's Mouth. Less than half a mile from Trinidad this shoal is dry at low water, and called the Isla de Soldado. Between this island and Trinidad is the narrow entry into the gulf, which can only be passed with a strong south-west wind.

The gulf itself may be considered as one of the most extensive and best harbours in the globe. It offers nearly everywhere excellent anchorage, especially along the coasts of the island of Trinidad. Its depth, except near the shores, varies between 8 and 30 fathoms, and the ground is everywhere free of rocks. It is only along the south-western coast that there are sandy shoals, which have from 3 to 5 fathoms water on them. The water is as salt as that of the Atlantic, though it receives a great volume of fresh water by those mouths of the Orinoco which fall into it and by the river Guarapiche, which enters it not far from its western extremity. It is supposed that the current which sets through the gulf in a northern direction is caused by the waters of the Orinoco. The tides also, which rise about six feet, run with great force.

(Depons, *Voyage à la Partie Orientale de la Terre Ferme, &c.*; Lavaysse's *Description of Venezuela, Trinidad, Margarita, and Tobago.*)

PARIAN CHRONICLE is the name given to a block of marble preserved at Oxford, which contained in its perfect state a chronological account of the principal events in Grecian history during a period of 1318 years, beginning with Cecrops B.C. 1582, and ending with the archonship of Diognetus at Athens, B.C. 264. The chronicle of the last ninety years is however lost, so that the part which now remains ends at the archonship of Diotimus, B.C. 354. This chronicle was purchased at Smyrna, together with several other relics of antiquity, by Mr. William Petty, who was employed by the earl of Arundel, in the year 1624, for the purpose of making collections for him of antient works of art in Greece, Asia Minor, and the islands of the Archipelago. Gassendi states in his 'Life of Peiresc' (lib. iv., ed. of 1629), who was counsellor in the parliament of Provence, and a munificent patron of arts and learning, that the Parian Chronicle was first discovered by means of Peiresc, and was purchased for him by one Sampson, his agent at Smyrna, for fifty pieces of gold; but that when it was ready to be sent on board, Sampson was thrown into prison, and that the Chronicle was afterwards purchased for Lord Arundel, by Mr. Petty, at a much higher price. Dr. Hales, in his 'Analysis of Chronology' (vol. i. p. 103, 8vo. edition), brings forward several reasons to show the improbability of this account; but however this may be, the Chronicle reached London in 1627, and was examined, at the suggestion of Sir Robert Cotton, with great care by the learned Selden, in conjunction with Patrick Young, librarian to James I. and Charles I., and Richard James, Fellow of Corpus Christi College, Oxford. 'Many of the characters,' says Selden, 'were entirely obliterated, and many nearly so; nevertheless, by the assistance of glasses, and the critical sagacity of my very kind friend Patrick Young, after a great many repeated trials, I have restored them as well as I could.' The Chronicle was published by Selden, together with other inscriptions which were brought to England by Mr. Petty in the following year (1628), under the title of 'Marmora Arundelliana.'

During the civil war in the reign of Charles I., the Earl of Arundel removed to Antwerp, and many of the marbles which were deposited in the gardens of Arundel House were defaced and broken, or used to repair the house. The latter was the fate of the Parian Chronicle; the upper part of it, containing at least half the inscription, is said to have been worked up in repairing a chimney at Arundel House; but fortunately a copy of it was preserved in Selden's work.

In 1667 the Hon. Henry Howard, grandson of the Earl of Arundel who obtained the chronicle from Greece, presented it to the university of Oxford, where it is preserved, together with other antiquities collected by the Earl of Arundel, in a room adjoining to the public schools, called the Museum Arundelianum. The Chronicle was published again in Prideaux's 'Marmora Oxoniensia,' fol. 1676, which was reprinted in 1732, under the care of Michael Maittaire, and again in 1791, Oxford, under the care of W. Roberts. In Chandler's 'Marmora Oxoniensia,' which was published in 1763, great pains were bestowed upon the Parian Chronicle, and many parts in which the inscription was defaced were supplied by conjectures, which are frequently very ingenious and probable. It has also been published, with an English translation, in the works of Robertson, Hewlett, and H[illegible], which are mentioned in the course of this article.

The authenticity and antiquity of this Chronicle was never called in question till the latter end of the last century, when a work was published by the Rev. J. Robertson, under the title of 'The Parian Chronicle, or the Chr[illegible] of the Arundelian Marble, with a Dissertation concerning its Authenticity,' London, 1788, in which it is maintained to be a fabrication of modern times. The principal objections brought forward by Robertson are:—1, That the characters have no certain or unequivocal marks of antiquity. 2, It is not probable that the Chronicle was engraved for private use. 3, It does not appear to have been engraved by public authority. 4, The Greek and Roman writers for a long time after the date of this Chronicle complain that they had no chronological account of the affairs of ancient Greece. 5, This Chronicle is not once mentioned by any writer of antiquity. 6, Some of the facts seem to be taken from authors of a later date. 7, Parachronisms appear in some of the epochas, which we can hardly suppose a Greek chronologer in the 129th Olympiad would be likely to commit, &c.

The objections of Robertson were replied to by Mr. Hewlett, in a work entitled 'A Vindication of the Authenticity of the Parian Chronicle,' London, 1789; by Mr. Gough, in the ninth volume of the 'Archæologia;' and by Porson in the 'Monthly Review,' in 1789. His objections have been more recently noticed in the first volume of Hales's 'Chronology;' and the whole subject has been investigated with great accuracy by Boeckh, in the second volume of his 'Corpus Inscriptionum.' The authenticity of the Chronicle has been also defended by Wagner, Gött., 1790, 8vo. The result of these inquiries can leave little doubt respecting the authenticity and antiquity of the Chronicle; and the subsequent silence of classical writers respecting it, which is perhaps the strongest argument against its antiquity, may be accounted for, as Dr. Hales has remarked, by the retired and insular situation of Paros. It is written in pure and classical Greek; the characters bear several marks of antiquity; and none of the passages adduced by Robertson to prove that parts of it were taken from writers of a later date are sufficient to establish the fact. Mr. Robertson supposes 'that it must have been a spurious fabrication of some learned Greek as late as the sixteenth century, executed from a mercenary motive of gain, in order that it might be sold for a high price at Smyrna, a commodious emporium for such rarities, after he had artfully broken the block, and defaced the inscription in several places, in order to give it an air of antiquity.' This supposition however is very improbable. The inscription could not have been engraved without great trouble and expense; and the events it relates show a greater acquaintance on the part of the engraver, or the person under whose direction it was engraved, with the history of the civilization and literature of Greece, than we can suppose to have been possessed by any Greek in the sixteenth century.

The marble on which the Chronicle was engraved was five inches thick, and measured, when Selden viewed it, 3 feet 7 inches by 2 feet 7 inches; but one corner had been broken off. It contained at that time 93 lines, reckoning the imperfect ones, and might originally perhaps have contained a hundred. Upon an average the lines consist of 130 letters, all capitals, in close continuation, and unbroken into words. The events which it records are not so much those which relate to the history of the different states of Greece, but rather such as serve to illustrate the history of the civilization and literature of Greece. Thus we do not find one event in the Peloponnesian war either mentioned or alluded to, but we have an account of the establishment of the principal religious festivals, of the introduction of the different kinds of music into these festivals, of the origin of tragedy and comedy, and of the time in which the most eminent poets and philosophers lived. But as a few extracts from the Chronicle will give a better idea of its nature and contents than any description could impart, we subjoin a literal translation of two different parts, the former taken from the beginning, and the latter from the middle of it. The words and letters in brackets are a translation of those Greek words and letters which are supplied by the conjectures of Selden and Chandler, but are effaced in the original.

'I have described pr[eceding] times, begin[n]ing from Cecrops, the first who reigned at Athens, to [Ast]yanax, archon in Paros, and Diognetus at Athens.

1. 'Since Cecrops reigned at Athens, and the country was called Cecropia, before called Actice, from Actæus, a native autochthon, 1318 years.

2. 'Since Deucalion reigned by the side of Parnassus [illegible] in Lycoreia, Cecrops [rei]gn[ing] at Athens, 1310 years.

3. 'Since the cause was tried at Athen[s be]tween Ares and Poseidon concerning Halirrhothius the son of Poseidon, and the place was called Areopagus (Ἄρειος πάγος), 1268 years, Cr[anau]s reigning at Athens.

4. 'Since the deluge happened in the time of Deucalion, and Deucalion escaped the rains, [and went] from Lycoreia to Athens, to [Crana]o, and bu[i]lt the temp[le of Zeu]s [Olympios and] offered sacrifices for his preservation, 1265 years, Cra[n]a[u]s reigning at Athens.

5. 'S[ince Amph]ictyon, the son of Deucalion, reigned in Thermopylæ, and assembled the people inhabiting that district, and [call]ed them Amphictyones, and [the place of meeting P]ylæa], wh[ere] now also the Amphictyones still sacrifice, 1258 years, Amphictyon reigning at Athens.

6. 'Since Hellen the son of Deu[calion], reigned in [Phthi]otis, and they were [na]med Hellenes, who before were called Graikoi, and [they established] the Panathe[naean] games (ἀγῶν), 1257 years, Amphictyon reigning at Athens.'

52. 'Since Xerxes formed a bridge of boats on the Hellespont, and dug through Athos, and the battle was fought at Thermo[py]læ, and the sea-fight by the Greeks at Salamis against the Persians, in which the Greeks were victorious, 217 years, Calliades being archon at Athens.

53. 'Since the battle at [P]latæa was fought by the Athenians against Mardonius, the general of Xerxes, in which the Athenians conquered, and Mardonius died in the battle, and the fire flowed [in Sic]ily around Ætna [2]16 years, Xantippus being archon at Athens.

54. 'Since [Ge]lon, the son of Deinomenes, became tyrant [of Syracuse], 215 years, Timosthen[es] being archon at Athens.

55. 'Since Simonides, the son of Leoprepes, the Cean, who invented the art of memory, got the prize at Athens teaching [a chorus], and the statues of Harmodius and Aristogeiton were erected, 2[14] years, [A]dimantus being archon at Athens.

56. 'Since Hiero was tyrant of Syracuse, 20[8] years, Ch[ar]es being archon at Athens. Epicharmus, the poet, also lived at this time.

57. 'Since Sophocles, the son of Sophillus, who was of Colonos, gained the victory in tragedy, being 28 years of age, 206 years, Apsephion being archon at Athens.

58. 'Since the stone fell in Ægos Potami, and Simonides, the poet, died, having lived 90 years, 205 years, Theagenides being archon at Athens.

59. 'Since Alexander died, and his son Pe[r]diccas reigned over the Macedonians, 19[8] years, Euthippus being archon at Athens.

60. 'Since Æschylus, the poet, having lived 69 years, died at [Gel]a in [Si]cily, 193 years, Call[i]as the First being archon at Athens.

61. 'Since Euripides, being 43 years of age, first gained the victory in tragedy, 17[9] years, Diph[ilus] being archon at Athens. But Socrates and [Ana]xagoras lived in the time of Euripides.'

The preceding extracts are sufficient to give a general idea of the nature and contents of the Chronicle. For an examination of the dates which are assigned to the different events it records, the reader is referred to the first volume of Hales's 'Analysis of Chronology.'

PARIAS. [HINDUSTAN, vol. xii., p. 232.]

PARIETAL BONES. [SKELETON.]

PARIME MOUNTAINS, THE, are an extensive system of mountains in South America, which spread over the surface of English, Dutch, and French Guyana, and also over a great part of the eastern portion of the republic of Venezuela and the north-east districts of the empire of Brazil. In length they extend nearly 1200 miles, between 51° and 68° 30′ W. long. Their width varies between 140 and 450 miles, between the parallels of 1° and 8° N. lat. According to a rough calculation, this mountain-system covers a surface of about 400,000 square miles. The mountains are separated from the shores of the Atlantic by a low and flat country varying in width between 30 and 70 miles. The river Orinoco runs along the western and partly also along the northern base of the mountains.

The term mountain-system cannot properly be applied to this region. So far as it is known, it is only a huge mass of rocks, which gradually rise higher as they advance southward, until their general level attains an elevation of from 1500 to 2000 feet. The surface of this rising ground extends in many parts in level or in nearly level plains of some extent, but in others it is greatly diversified by hills, either isolated or forming ridges several miles long, and by short valleys or depressions. Few of the hills and ridges rise more than some hundred feet, and a very few summits attain more than 1000 feet above their base. The country along the watercourses is thickly wooded, as well as the greater part of the country between them, but many of the level tracts are savannahs without trees, or only covered with low bushes, which however display a great luxuriance of vegetation. Such is the nature of this region as far south as 2° N. lat. east of 58° W. long., but only as far south as 4° N. lat. west of 58° W. long.

West of 58° W. long. and near 4° N. lat. a continuous range begins, which runs westward to 64° W. long. nearly under the same parallel, and west of 64° W. long. inclines more to the south, so that at its termination near 66° W. long. it reaches nearly to 3° N. lat. This range is called Sierra Pacaraima. In its eastern part it rises from 1500 to 2000 feet above its base, and from 3000 to 4000 feet above the sea-level. Farther west it rises several thousand feet above the sea, and terminates with the Cerro Maraguaca and Cerro Duida, whose summits attain an elevation of about 10,000 feet. Along the southern base of the Sierra Pacaraima the Rio Parime runs eastward, and the Rio Tokoto westward, and by their junction near 60° W. long., the Rio Branco, an affluent of the Amazonas, is formed. The two branches of the Rio Branco drain an extensive valley, which is enclosed on the south by another ridge of less elevation.

East of 58° W. long., the highest part of the mountain-region, which is called on our maps Serra de Acaray, seems to lie between 1° and 2° N. lat. But we are entirely unacquainted with its extent and elevation. At its eastern extremity several ridges branch off northward, which traverse the French colony of Cayenne, and render its surface more mountainous than the territories of Dutch and British Guyana. [GUYANA.]

The Serra Acaray is not connected with the Sierra Pacaraima by a ridge. There is a break between them in the mountain-region, which is occupied by the wide valley in which the river Rupunoony runs eastward to the Essequibo and the Rio Tokoto westward to the Rio Branco. Where the two rivers approach near to one another (near 3° 30′ N. lat.), they are separated by a low level tract. This tract contains a lake called Amucu, which in the dry season is small, but at the end of the rainy season inundates the adjacent country to a considerable extent. A portion of the accumulated water finds its way to the Rupunoony; the remainder is carried by the Rio Pirarara to the Tokoto. At this time small canoes may pass from the Rupunoony to the Rio Branco. In the dry season the waters of the lake are only discharged into the Tokoto by the Rio Pirarara.

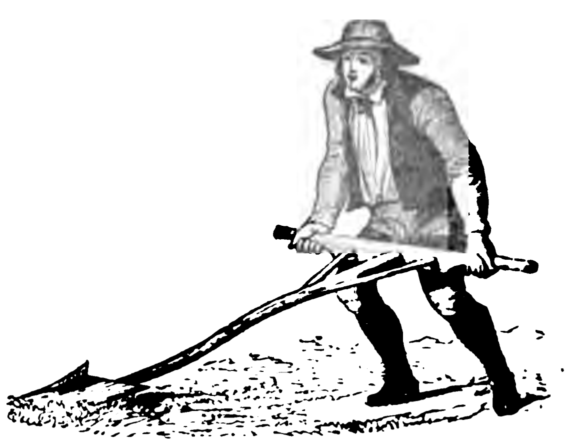
This mountain-region does not contain wide and extensive valleys in which rivers flow over a gently inclined slope, but only rocky masses through which the waters have forced their way in a deeply excavated bed between rocky banks of several feet elevation. Accordingly all the rivers of this region are nearly an uninterrupted succession of rapids and cataracts, which render their navigation very difficult, and the transport of heavy goods nearly impossible. It is only in the lower part of their course, where they run through the level country which separates the mountain region from the sea, that there are no impediments to navigation.

(Humboldt's *Personal Narrative;* Schomburgk, in *London Geographical Journal*, VI. and VII.)

PARING AND BURNING. This operation consists in cutting a thin slice from the surface of land which is overgrown with grass, heath, fern, or any other plants which form a sward by the matting together of their roots. The sods are allowed to dry in the sun to a certain degree, after which they are arranged in heaps, and burnt slowly, without flame or violent heat. The result is a mixture of burnt earth, charred vegetable fibre, and the ashes of that part which is entirely consumed.

The object of this operation is twofold: first, to kill insects and destroy useless or noxious weeds completely; and secondly, to obtain a powerful manure, impregnated with alkaline salts and carbonaceous matter, which experience has shown to be a very powerful promoter of vegetation.

The instruments by which this is effected are, either a common plough with a very flat share, which may be used when the surface is very level without being encumbered stones or large roots, as in low moist meadows, or in other cases a paring-iron used by hand. (See *fig.*) The



crossbar of this instrument is held with both hands; and the upper parts of the thighs, being protected by two small slips of board, push the instrument into the ground, so as to cut a slice of the required thickness, which is then turned over by moving the cross-handle. The labour is severe, and a good workman can scarcely pare more than one-sixth of an acre in a day. The price of this work is from 15s. to 25s. per acre, according to the price of labour. The drying, burning, and spreading of the ashes are contracted for from 10s. to 15s. more: thus the whole cost is from 25s. to 2l. per acre. In France it is done by a *cob*, which is like a shipwright's adze, and the operation is called *écobuer*.

Paring and burning the surface is an almost invariable preliminary in the converting of waste lands to tillage; and where these lands are in a state of nature, overrun with wild plants which cannot be easily brought to decay by simply burying them in the ground, burning is the readiest and most effectual mode of destroying them. In this case the practice is universally recommended and approved of.

But it is not only in the reclaiming of waste lands, and bringing them into cultivation, that paring and burning the surface is practised. The fertility produced by the ashes, which is proved by the luxuriance of the vegetation in the first crop, has induced many to repeat this process so often, as materially to exhaust the soil, and induce partial sterility. Hence the practice has been recommended on the one hand, and strongly reprobated on the other.

When we come to apply to the subject the test of experience, and reason correctly on the facts which are presented to us by the abettors of the practice and its adversaries, we shall find that the advantages and disadvantages arise chiefly from the circumstances under which the operation is carried on. But it may be necessary to an impartial examination of the subject, to inquire into the changes produced on the substances subjected to the process of burning, when it is done with due precautions.

In burning vegetable matter in an open fire, the whole of the carbon is converted into carbonic acid and flies off, leaving only some light ashes containing the earthy matter and the salts which the fire could not dissipate. These are no doubt very powerful agents in promoting vegetation, when they are added to any soil: but they are obtained at a very great expense of vegetable matter, which, by its decomposition in the earth, might also have afforded food for vegetation. If the earth which is burnt with the sods is of a cold clay nature, the fire will change it into a kind of sand, or brick dust, which is insoluble in water, and corrects the too great tenacity of clays, by converting them more or less into loam. This is so well known, that clay is often dug out of the subsoil to be partially burnt. On stiff clay soils therefore there is a double advantage in paring and burning, that of the vegetable ashes and of the burnt clay. When the fire is so managed that the vegetable matter is only partially burnt, the oily and inflammable portions being converted into vapour by the fire without being destroyed, and absorbed by the earth, the effect produced is only to impregnate the earth with minute particles of matter, readily converted into the constituent parts of vegetables. The earth is the mere recipient of these particles, which are held in its pores, as water is in a sponge, ready to be let loose to any substance which has the power of attracting them. The moisture, which the dry earth will also absorb from the atmosphere if rain should fall, is retained and increased by the effect of salts with which it is impregnated. It is uniformly observed that turnip-seed, which in most soils will not vegetate without heavy dews or rains, if sown in dry weather, scarcely ever fails to spring up in the ashes of a soil that has been pared and burnt. May not this be ascribed to these particles, which have been taken up by the earth in the operation of slow combustion, absorbing moisture from the air, and giving it out to the seed which has been sown? It does this better than a heavy shower would: a heavy shower soaks the ground for a short time, and swells the seed; but, if it be succeeded by a hot sun, the water evaporates so rapidly, that the seed loses its moisture, and vegetation stops. The earth, which attracts moisture from the air, keeps it, its absorbent nature preventing the evaporation; and it furnishes it gradually to the vegetating seed as it is required. The wonderful effect of peat-ashes on young clover may be explained on the same principle, and probably also that of gypsum. There can be no doubt then, that considerable advantages may result from the operation of paring and burning the surface of clays. But what is lost and destroyed in the operation? All that escapes in the shape of gas or vapour. The gas will probably be carbonic acid; for this is formed by the combustion of charcoal. We know that hot lime has a very strong attraction for this substance, which it fixes in a solid state, becoming a carbonate of lime: and we have no reason to think that it parts with it to the roots of plants. But other earths may absorb carbonic acid without having so great an attraction for it, and let it loose to water, with which it is known to combine in certain proportions, and to be thus carried into the vessels of growing plants by the suction of the roots. If this should prove to be the case, we may account for the great effect of burnt soils in promoting vegetation.

The principal objection to burning is, that it destroys a great portion of vegetable matter. But this is a fact to be proved, and is perhaps rashly taken for granted. When vegetable matter decays in the earth, it loses much of its substance, which is converted into volatile matter, and flies off into the atmosphere. It is possible that thus more is lost during the time that the slow decay goes on, than even in burning with due precautions. This is a fact which it may be difficult to ascertain; but it is not impossible; and therefore the assumption of the contrary requires to be founded on some proof or experiment. The earthy portion of the soil may be diminished, by driving out the water which it holds, as is manifest in burning clay, and it shrinks into a smaller space; but there is as much earthy substance as before, and this substance is improved by the burning. It appears then, that a clay soil may be pared and burnt, without its real substance being diminished; and if its texture is improved, it becomes more fertile by the operation.

Burning clay soils is in fact something analogous to liming. Lime dissolves the vegetable matter, and enables the elements to enter into new combinations; but if no new vegetable matter be added to restore what is exhausted by vegetation, liming, as well as paring and burning, is detrimental to the soil. Many experienced farmers pare and burn the sod on the edges of their ditches and on the banks on which the hedges grow, because they thereby exterminate many rank weeds; and the burnt earth mixed with farmyard dung makes an admirable compost. Here the burnt earth acts as an absorbent, and no doubt attracts many of the volatile parts of the manure, which are produced by the decomposition of animal and vegetable matter in it. Paring and burning therefore should be joined to manuring, if a powerful and immediate effect is desired without exhausting the soil; and in this case we do not hesitate to recommend it on all cold clay soils where rank weeds are apt to spring up and coarse grasses take the place of the better sorts which have been sown. The proper time to pare and burn is evidently after the land has lain in grass for several years, and is broken up for tillage. The surface should be pared thin; about two inches is the extreme thickness allowable for the sod if the soil is very stiff and poor, and as thin as possible in a better soil. It should be pared with a breast-plough or paring iron by manual labour. The sods should be moderately dried, and then arranged in small heaps with a hollow in the middle to hold heath or faggots to kindle the fire. When it has fairly established itself, all the apertures should be carefully closed. Wherever any smoke breaks out, a fresh sod should be immediately put over it; a heap containing a small cart-load of sods should be smouldering for several days without going out, even if it rains hard. If the fire is too brisk, the earth will form hard lumps, and even vitrify; but otherwise it comes out in the form of a fine powder, in which evident marks of charcoal appear. If this is of a fine red colour, it is a good sign; for the iron in the earth has been converted into a peroxide, which is perfectly innocent in its effects on vegetation, whereas all the saline impregnations of iron are more or less hurtful. It is better to burn the sods in large than in small heaps; for the more the fire is smothered, the better the ashes.

So great a quantity of ashes is sometimes produced as to admit of a portion being carried off on grassland, or used to manure another field for turnips. As this is evidently robbing the field where the operation has been carried on, an equivalent quantity of manure should be brought in exchange. Perhaps the most advantageous mode of using the ashes is to spread them in the drills where the turnip-seed is to be sown, after a portion of dung has been buried under them. In this manner the ashes from one acre of land pared and burnt, together with ten or twelve cart-loads of good yard dung, will manure two acres, and all the manure of one acre, in the ordinary mode of raising turnips on ridges, will be saved. If the ashes will produce as good turnips with half the usual quantity of dung, the expense of paring and burning is amply repaid. But experience proves that the earth and ashes almost ensure a good crop of turnips in many poor stiff soils in which they would probably not have succeeded if sown in the common course of cultivation without bones or ashes.

When a considerable extent of poor land is brought into cultivation, and there is no sufficient supply of manure at hand, paring and burning a portion of the land every year, by which a crop of turnips is obtained, is a most effectual means of improvement. Lime may be used at the same time with the ashes, and will increase their effect, provided some vegetable undecayed matter remains in the soil after paring; but lime will tend to exhaust this; and if, in consequence of liming, a few good crops of corn are obtained at first, the soil will be so exhausted as to be of little value afterwards. This is the abuse of the practice, which has caused it to come into disrepute. It would be a great waste to burn the surface of a rich piece of grassland where the plants growing in it are tender and succulent, and would readily rot on being ploughed under; in such case a moderate application of lime would have a much better effect. This kind of land will produce good crops without any manure, and continue fertile for many years if judiciously cultivated. To pare and burn rich land is wasteful, and can never be recommended. It is only on poor land which has not strength to produce a crop, and of which the texture requires to be improved and its powers stimulated, that paring and burning is advantageous; on poor thin chalky soils which have been laid down with sainfoin, of which the roots and stems are grown coarse and hard, so as not readily to rot in the ground, the operation is proper and advantageous. The turnips produced by the ashes, with or without the assistance of dung, must be fed off by sheep folding on the land, whose dung and urine will enrich it, and their tread consolidate it. By this mode of proceeding great advantages are obtained from paring and burning, and the land, so far from being deteriorated, will be improved.

Many landlords rigidly forbid their tenants to pare and burn any part of their land, from an idea that the heart of it is destroyed by the burning. If they would only insist on a certain quantity of dung being put on, either at the same time that the land is thus treated, or for the next crop, and prohibit the sowing of corn crops except after turnips, clover, or some other green crop consumed on the farm, there would be little danger of any detriment to the land, even if it were pared and burnt once in every ten or twelve years, provided it were judiciously treated in the intervals. The farmer would be benefited in many situations, and the practice would tend to keep up the value of the farms.

In Devonshire, where the land has been pared and burnt from time immemorial, even where the soil is rich, the practice has been often resorted to without any judgment. Provided a crop of corn or potatoes was obtained at little cost, the consequences to the future state of the land were not heeded; and landlords, seeing their farms impoverished, put a stop to the practice. Thus many useful modes of cultivation have been reprobated from the abuse of them, which, properly applied, would have been advantageous to all parties.

There is no maxim more true than this: that whatever injures the landlord, injures the farmer who is not desirous of removing, and *vice versâ*; and all positive restrictions on cultivation, however necessary when there is a fear of dishonest conduct, diminish the value of a farm and lessen the rent which can be fairly afforded for it. Ignorance is often a greater destroyer of the interest of both landlord and tenant than wilful dishonesty; and the spreading of useful information amongst tenants, so that they may see their own advantage, is the surest means of improving landed property. Many tracts of waste land might be brought into cultivation by means of paring and burning, which without it would never repay the labour required. Where the soil is inclined to peat, this operation and abundant liming are the indispensable preliminaries of cultivation. The ashes and the lime will produce vegetation and food for animals. These will produce dung to supply what the vegetation abstracts, and to assist also in the further decomposition of the peaty matter, converting it into vegetable mould.

The first crop after paring and burning, as was observed before, should, if possible, be turnips, and these should be consumed on the spot; but there are exceptions to the rule. The soil may be a stiff clay of a considerable degree of natural fertility, only encumbered with rank weeds and grasses. In this case the surface is burnt to destroy these, and a crop of corn may safely be taken after the paring and burning, the land coming into a regular alternate rotation after it. For example, the next crop may be beans or tares, with a good proportion of dung; or clover may be sown with the first crop, if the ground appears fit for it. The effect of the ashes will be readily perceived in the luxuriance of the clover. Such land may be afterwards cultivated, according to its nature and quality, with the rest of the farm; or laid down to grass after a course of cleansing and ameliorating crops. Thus old wet meadows, after having been well underdrained, may be greatly improved, and either converted into arable fields or laid down again with choice grasses.

Old rough pastures may often be greatly improved by a very thin paring and burning, so as not to destroy all the roots of the grass. When the ashes are spread over the pared surface, some good grass-seeds are sown with them. The whole is well harrowed or scarified and rolled, and the grass which will spring up after this will be greatly improved, and will fully repay the expense of this simple mode of renovating it. This is the cheapest mode of improving coarse pastures, that we know, without breaking them up.

The partial paring and burning of the headlands of fields, for the purpose of mixing the ashes and burnt earth with dung in a compost, is a most excellent practice, and often superior to that of using the sods only, without burning them. These sods contain innumerable seeds of weeds, and eggs or maggots of insects, which are not destroyed by the fermentation of the heap, but on the contrary, are brought to life. The loss of a portion of vegetable matter in the burning is amply compensated by the destruction of these enemies of the future crops.

It now only remains to take notice of the soils and situations where paring and burning cannot be recommended. Wherever the soil is very loose from a great proportion of silicious sand in its composition, and is held together chiefly by the slender roots which run through it, the burning would destroy the whole of the vegetable matter; for none of the volatile parts which the fire dissipates or generates would be retained or absorbed, but would pass through the loose sand in the same way that water would. Here then would be actual destruction; and the residue would be a mere barren silicious sand, much worse and more porous than it was when held together by the roots. The only way to bring such soils into cultivation is to put clay or marl on them, and to force vegetation by means of liquid manures, chiefly the urine of animals, consolidating them by every means applicable, so that they may retain moisture, and that the manure may not be washed through by the rains. Such soils may be improved, but they are the most ungrateful of any; and it is only necessity and indefatigable industry which can make them produce any crops.

It is very easy to ascertain whether any soil will be improved, or not, by paring and burning. A few sods may be taken and exposed to heat in an iron pot closely covered over, or in a large crucible: the heat should not be so great as to produce light, but should be kept up for a considerable time, till the sods are consumed. If the ashes are red, and the whole is in a fine powder, with particles of charcoal in it the soil from which it was taken may be safely pared and burnt, especially if it forms a mud with water, and the earth is not readily deposited. But if it feels gritty, lets the water readily through, and is soon deposited when mixed with it, burning will not be advantageous. This is the evident result of the principles laid down before.

On the whole, the operation of paring and burning, when judiciously applied and properly performed, is a most excellent and cheap improvement of certain soils, and it will never diminish their fertility, if they are properly cultivated and manured, and a judicious succession of crops is adopted; but on the contrary it will improve their quality and texture, and make them more productive.

PARI'NI, GIUSEPPE, one of the best and most popular Italian poets of the eighteenth century, was born in the district of Bosisio near the lake of Pasiano, in the Milanese territory, May 22, 1729. His father, though poor, was anxious to bestow upon him a good education, and for that purpose removed to Milan. He was however obliged to seek to support himself at an early age, by copying, and it was only in the intervals of his employment that he could study the best writers, both Latin and Italian. In compliance with the wishes of his friends, he published a volume of poetry, at the age of twenty-three; which procured for him admission into the Accademia dei Transformati at Milan, and that of the Arcadians at Rome. These distinctions obtained him other patrons, and he was successively engaged as tutor in the Borromei and Serbelloni families, which office he accepted chiefly in order that he might be able to support his mother, who was now become infirm. It was in 1763 that he published the 'Mattino,' the first part of his celebrated poem 'Il Giorno;' which he had been induced to do by Count Firmian, then Austrian minister of Lombardy, who after employing him some time in editing a gazette, appointed him professor of belles-lettres in the Palatine schools (*scuole palatine*) at Milan, and, on the suppression of the Jesuits, promoted him to the professorship of eloquence at the college of the Brera. His course of lectures, which were printed, was as favourably received as were those which he afterwards gave on the fine arts; and both of them contributed materially to disseminate an improved taste. After the death of his patron Count Firmian, cabals were excited against him, and he was at one time in imminent danger of losing his appointments, owing to his refusing, for some reason or other, to compose, as he had been commissioned to do, an éloge on the empress Maria Theresa. Notwithstanding this, Leopold II. promoted him to the prefectureship of the Brera, with an increased salary. At the period of the French revolution politics began to engage his attention; he espoused doctrines that he considered favourable to the interests of society generally, and with such enthusiasm, that General Bonaparte and Saliceti caused him to be elected one of the magistrates of Milan; but being disappointed in his expectations of being able to serve his fellow-citizens, he requested permission to retire from office, and bestowed on the poor the emoluments he had derived from it. From this period he lived in retirement, poor but respected. In addition to his general ill state of health, he was obliged in his seventieth year to undergo an operation. He died August 15, 1799, and the astronomer Ordani caused a monument and bust of him to be erected in the college of the Brera.

His principal production, 'Il Giorno,' may be considered an ironical didactic poem, wherein, pretending to instruct a youth in the various duties and economy of a fashionable day, he satirises the frivolities, the follies, and vices of the idlers and triflers who constitute what is called the great world. Yet although it is relieved by many agreeable episodes, the continued strain of irony and mock solemnity becomes rather fatiguing; and though the style is elegant, it is somewhat too ornate and laboured for the subject. Besides this and his lyrical pieces, Parini also wrote some *rime piacevoli*, and other compositions of that class.

PARIS, the metropolis of France, situated on the river Seine, in 48° 50′ N. lat. and 2° 20′ E. long., about [illegible] miles in a direct line south-south-east of London; or [illegible] by the usual route, viz. 72 miles from the [illegible] office, London, to Dover; about 22 miles [illegible] Dover to Calais; and 157 miles from Calais [illegible] Beauvais, to Paris. It is in the [illegible] which it is the chief town.

Paris is mentioned by Cæsar [illegible] (*De Bell. Gall.*, vi. 3; vii. 57, [illegible] town of the Parisii, a tribe probably of the Belgic stock. In that part of the Seine which now traverses Paris were anciently five small islands, on one of which, now the island of La Cité, Lutetia stood. This island was then of smaller dimensions than at present, two smaller islands at its western extremity having been incorporated with it. Lutetia, anterior to the Roman conquest, was an unwalled place. The etymology of the name of the Parisii has been much disputed. Dulaure conjectures that it meant 'inhabitants of the frontier.' A British tribe, in the neighbourhood of the town of Hull in Yorkshire, had the same designation.

In B.C. 54, Cæsar convoked at Lutetia an assembly of the nations of Gaul. (Cæs., *De Bell. Gall.*, lib. vi. 3.) In the general rebellion of the Gallic nations the following year, Lutetia was burnt by the Gauls to prevent its falling into the hands of the Romans; but it subsequently came with the rest of Gaul into their power, and in the division of the country made by them was included in the province of Lugdunensis Quarta, or Senonia.

For the next four centuries the place is hardly noticed, except by the geographers, by whom the name is variously written; nor does it appear to have been of any importance until the later period of the Roman dominion. About A.D. 358 or 360 it took the name of the tribe to which it belonged, Parisii. It was the seat of a bishopric, perhaps as early as the middle of the third century. Lutetia was the favourite residence of Julian while he governed the provinces of Gaul with the rank of Cæsar. In or about the year 494 it was taken by the Franks under Clovis. Under the Romans the buildings connected with the town extended beyond the island to both banks of the river.

Several traces of Roman possession have been discovered at Paris, and some still remain. In the isle of La Cité, beneath the choir of the cathedral of Notre Dame, an altar of Jupiter was dug up, or rather a number of stones bearing sculptures in relief and inscriptions. These inscriptions, which belong to the reign of Tiberius Cæsar, indicate that at Lutetia the gods of the Romans and those of the Gauls were jointly worshipped. In 1784, during the erection of the Palais de Justice (courts of law), a sculptured stone more than six feet high, with figures in relief on its four sides, was discovered. On the north side of the Seine the remains of a subterranean aqueduct were discovered in forming the place or square of Louis XV. (A.D. 1763); and a basin, presumed to be connected with this aqueduct, was discovered in the garden of the Palais Royal. Remains of tombs and other sepulchral antiquities have been discovered in the Rue Vivienne, near the Palais Royal, and on the north bank opposite La Cité. Other antiquities were found at La Villette in digging the basin of the canal of the Ourcq, and at Montmartre. On the south side of the Seine there are some remains, opposite the isle of La Cité, which consist of a large vaulted hall or apartment, with another apartment opening into it, or rather forming a recess in it: the masonry of these consists of alternate courses of stone and brick, covered in some parts with stucco. Some remains of a subterranean aqueduct have been traced in different parts of its course from the village of Arcueil, five miles south of Paris, to Paris, and many antiquities were dug up in the gardens of the Luxembourg. The lower part of the tower of the church of St. Germain-des-Prés is supposed to be a remain of the original church built on that site by the Romans, and first dedicated to Sainte-Croix and St. Vincent.

Clovis, some years after the capture of Paris, fixed his residence there (A.D. 508), and was buried there (A.D. 511). It once came to one of the kingdoms into which the dominions of the Franks were divided, and was afterwards comprehended in the kingdom or district of Neustria. After A.D. 567 it ceased to be the residence of the kings of the Franks. Several of the churches and other religious establishments of Paris were founded in the reigns of the Merovingian princes.

In 845 the Northmen or Normans pillaged the city, which the inhabitants had deserted: in 856-7 they pillaged it a second time, and burnt some churches: in 861 they pillaged it a third time, and burnt some more churches. At this time they broke down 'Le grand Pont' (the great bridge) over the wider arm of the Seine on the north side of La Cité, to enable their barks to ascend higher up the river. After their retreat, the bridge was repaired by Charles le Chauve. In 885 the Normans again attacked the place. The inhabited part of Paris was still limited to the island of La Cité, which was walled. The assailants, to the number of 32,000, made several unsuccessful attacks, and at length retired on the conclusion of a treaty with the emperor Charles le Gros (A.D. 886). In A.D. 978 the emperor Othon or Otho II., at the head of 60,000 men, advanced to Paris, burnt a suburb, but was soon after attacked and put to flight by Lothaire, king of France. Under the Carlovingians, Paris was the capital of a county comprehended in the duchy of France. Hugues Capet inherited both the county and the duchy; and, upon his assumption of the crown (A.D. 987), they became part of the royal domains.

Hugues Capet, now king, continued to reside at Paris, which thus again became the capital of the Frankish, or, as it may now be termed, the French kingdom. In the reign of Louis VI. (A.D. 1108-1137), it is probable that the fortresses of Le Grand Châtelet and Le Petit Châtelet on the north and south banks of the river, at the extremities of the two bridges from La Cité to the mainland, were built; they were demolished, Le Petit Châtelet in 1782, and Le Grand Châtelet in 1802. By the same king or his successor Louis VII. the suburbs on the north and south banks were inclosed by walls, and thus incorporated with the insular part of the city. Under Philippe II. Auguste, a new wall was built, comprehending a much larger enclosure than those of former times, both on the north and south bank, and some of the principal streets were paved; but as late as the time of Louis XIII. (A.D. 1610-1643) half the streets of Paris were still destitute of pavement. Two national colleges and three hospitals were founded, two market-places were built, two aqueducts formed to convey water to the northern part of Paris, and several fountains were erected. The space enclosed by the wall of Philippe Auguste was in several parts unoccupied or was devoted to culture; but the vacancies were filled up partly by the monasteries, churches, and colleges founded by Louis IX. (St. Louis), his grandson; and entirely by the buildings erected by succeeding princes; so that in the reign of Jean II. (A.D. 1350-1364), the town had outgrown its limits, and many edifices had been erected without the walls. In apprehension of an attack from the English after the battle of Poitiers (A.D. 1356), new walls were raised on the north side of the Seine, comprehending a yet larger enclosure than those of Philippe Auguste; and on the south side the old walls were repaired and the ditches deepened. The island of Notre Dame (now of St. Louis), immediately above that of La Cité, was also fortified by a ditch dug across it.

Le prevôt des marchands (the provost of the traders) was at this time a person of considerable importance. Paris had no regular municipality, but the traders or merchants who resided there had formed themselves into an associated body (*confrérie*), on which (A.D. 1220) Philippe Auguste had conferred several privileges and a limited judicial authority. This association, which was sometimes termed *La Hanse Parisienne*, gradually came to occupy the place of a municipal body.

The treaty of Troyes (A.D. 1420) and the events connected with it gave Paris into the power of the English party, and the city remained under the government of Henry VI., king of England and claimant of the throne of France; or rather, under the government of the regent duke of Bedford, from A.D. 1421 to 1436. In 1429 it was attacked by the troops of Charles VII. of France under the command of Jeanne d'Arc, but the assailants were repulsed. In 1436 it was taken by the French under the count of Richemont, constable of France, and the count Dunois, with the aid of the townspeople. The English garrison was surprised and put to the sword, except a few who retired to the fortress of the Bastille, and surrendered upon terms.

During the troubled period of the dynasty of Valois, the edifices, public and private, of the city were gradually improving in character. The population of Paris in the latter half of the fifteenth century is supposed by Dulaure to have been about 150,000. The police of the place was wretched; and it is a manifestation of the general insecurity, that the environs and suburbs, and occasionally Paris itself, were infested with wolves, which destroyed a considerable number of the inhabitants. The state of morals was extremely bad, and the clergy and monks and nuns seem to have shared in the general corruption.

In the reign of François I. the fortifications of Paris were repaired and strengthened. In the reign of Charles IX., A.D. 1566, the circuit of the walls was partially enlarged, in order to comprehend the palace of the Tuileries, then in course of erection, by Catherine de' Medici, the queen-mother. The residence of the king was at that time at the Louvre, originally a fortress of antient date, which had been made a royal residence, and enlarged and adorned by the care of successive sovereigns. It was at this time being gradually rebuilt. The rebuilding of the suburb of St. Germain, on the south side of the river, which had been ruined in the wars of the fifteenth century, was commenced and some of its streets paved in the time of François I.; and in the reign of Henri III. a bridge was erected (near where the Pont Royal now stands) to connect the quarter of the Louvre with this suburb. This appears to have been the only bridge across the undivided stream of the Seine. There were five other bridges which connected the island of La Cité with the main. Two of these, long known as *Le Grand Pont* (on the site of the present *Pont au Change*) and *Le Petit Pont*, had existed (or rather bridges at those parts had existed) from the time of the Romans. The *Pont des Moulins* (mills' bridge), connected La Cité with the north bank of the river a little below the *Pont au Change*.

The other two bridges were the *Pont Notre Dame* and the *Pont St. Michel*. *Pont Notre Dame*, a wooden bridge, which united La Cité with the north bank, was built A.D. 1413, in the place of a former private bridge communicating with some mills on the river, and rebuilt of stone (A.D. 1500-1512): it is at present the oldest bridge in Paris. Pont St. Michel, of antient but unknown origin, was rebuilt of stone (A.D. 1378-1387), damaged and repaired repeatedly, and was entirely rebuilt in the seventeenth century. In the reign of Henri II., successor of François I. (A.D. 1549), the erection of the present Hôtel de Ville was commenced, but it was not finished till more than half a century afterward. The police of the city continued to be in a wretchedly inefficient state. The number of robbers and others engaged in lawless pursuits was estimated by a contemporary authority at 6000 to 7000: the paupers were estimated by another authority at 8000 to 9000; both of which numbers are evident exaggerations. The whole population, in the time of Henri III., is estimated to have been 200,000 or upwards.

In the religious troubles of the sixteenth century, Paris was the scene of several remarkable events. [BARTHOLOMEW, MASSACRE OF ST.] In 1588 the Parisians, who had embraced the party of the League, barricaded the streets with chains, with the paving-stones torn up for the occasion, and with casks of earth; and manning the barricades with musqueteers, defeated the troops (to the number of 6000) which Henri III. had brought into the city. Henri quitted Paris next day, and the city came entirely into the power of the League. This revolt is known in history as 'the day of the barricades.'

Upon the assassination of the Guises at Blois (December, 1588), the Parisians broke out into a fresh revolt: the duke of Aumale was chosen governor, and the direction of affairs was assumed by a committee of the League, designated 'the Council of Sixteen.' Henri III., who had effected a reconciliation with Henri of Navarre, chief of the Huguenot party, advanced to besiege Paris, which was now under the command of the duke of Mayenne, brother of the murdered Guises: but the assassination of Henri III. at St. Cloud (August 20, 1589) arrested his purpose. The siege was formed on the 31st of the following October, by his successor Henri of Navarre, now Henri IV. The suburb of St. Germain was plundered, but the siege was raised soon afterwards, and the king retired with his army. In the following May (1590) the siege was renewed, the suburbs were all taken in one night, and the gates were strictly blockaded. The effect of this measure on a population so vast was truly dreadful. The most loathsome articles were consumed for food; numbers perished, and parts of the city were almost reduced to solitude. Henri, moved with compassion, allowed 3000 of the poorer class to pass out of the place, and repeatedly admitted supplies of provisions to enter. The approach of a Spanish force under the duke of Parma obliged him to raise the siege (August 30); and he did not obtain possession of his capital till March, 1594, and then only by bribing the governor (the duke of Brissac) and other influential persons.

In the reign of Henri IV. Paris received many improvements. The Pont Neuf, which had been commenced in the reign of Henri III., was completed by Henri IV., and the two westernmost of the islands in the Seine were united to La Cité. All the bridges, except the Pont Neuf, this time lined with houses. In respect of cleanliness and security from robbery, little improvement seems to have taken place. In the reign of Louis XIII. an immense number of religious establishments were founded at Paris. The palace of the Luxembourg was built by Mary de' Medici; the Jardin des Plantes was laid out chiefly by the desire and under the direction of Labrosse, one of the king's physicians; and the Palais Royal was built and the Académie founded by Cardinal Richelieu. New walls were erected on the north-west side of the city, enclosing a considerable space north of the Tuileries and extending the circuit of the enclosure nearly to the line of the present boulevards. The island of Notre Dame, or St. Louis, was entirely covered with houses and joined to the main by two bridges. The Pont au Change was rebuilt, and a wooden bridge thrown over the river where the Pont Royal now stands. The police of the city underwent little change: disorders of every kind were of frequent occurrence. In 1621 the mob made an attack on the Huguenots who were returning from worship at Charenton, mutilated the minister, and murdered several of the bearers. [CHARENTON.]

The minority of Louis XIV. was a troubled period, and Paris was the principal scene of disorder. The enemies of Mazarin, who were known by the designation of *Frondeurs* (slingers), or collectively as the *Fronde*, were supported by the Parisians. On occasion of the imprisonment of Broussel, one of the members of the parliament of Paris (A.D. 1648), the populace rose, barricaded the streets, repulsed the French and Swiss guards, and ultimately obtained the release of Broussel. Next year new troubles broke out; the Frondeurs, in arms, occupied Paris itself; the king's troops, under the prince of Condé, occupied St. Denis, St. Cloud, and Charenton, in the vicinity. Some skirmishes took place, but peace was soon made. In 1652 the prince of Condé, who had joined the party opposed to Mazarin and the court, was with his army attacked in the suburb St. Antoine by the royal army under Turenne, and was only saved from destruction by being admitted into Paris. Tumults and intrigues still continued until the entry of the king into Paris a few months after. The city suffered so much from this unsettled state of affairs, that in 1653 it was estimated that there were in Paris 40,000 paupers.

In the long reign of Louis XIV. (1643-1715) Paris was greatly extended and improved. A great number of religious and charitable establishments were founded, and new churches and chapels built. Among the more remarkable of the charitable institutions were the immense workhouse, called L'Hôpital Général or La Salpêtrière (established A.D. 1656), and its dependency, the Bicêtre [*BICETRE*], and the hospital or asylum for old soldiers, known as the Hôtel des Invalides. Louis made considerable alterations in the Louvre, completed the building of the Tuileries, laid out anew the gardens of that palace, and formed the public walk or garden of the Champs Elysées, and the places or squares of Vendôme, of Les Victoires, and of Le Carrousel. The triumphal arches or gates of St. Denis and St. Martin and many fountains were also erected at this time; the observatory and several theatres were built, and the Pont Royal and Pont de Grammont (the last connecting the isle Louvier with the northern bank of the river) were constructed. The old and now dilapidated fortifications on the north side of the Seine were demolished, and the present line of the boulevards in that part of Paris was formed; new streets were laid out, and quays made along the banks of the river: the police of the city experienced several improvements, the streets were lighted, though in a miserably inefficient manner, and the cleanliness of the city was somewhat attended to. The population of Paris, at the close of the reign of Louis XIV., was fast approaching half a million.

The long reign of Louis XV. (A.D. 1715-1774) and the earlier part of that of Louis XVI. (A.D. 1774-1792) furnish few local incidents. The distress caused by the financial projects of Law (A.D. 1720) occasioned some tumults. The years 1727-31 were marked by the extraordinary scenes of fanaticism which first occurred at the tomb Paris, a Jansenist clergyman. [JANSENISTS.] In 1775 the bakers' shops were plundered by a mob excited by the dearness of corn.

From the commencement of the reign of Louis XV. to the period of the Revolution, Paris received considerable accessions both to its extent and the number of its public buildings. Ecclesiastical establishments continued to increase: the church of Ste. Geneviève (the Pantheon of the revolutionary period), the *Hôtel des Monnaies* (or Mint), and the *École Militaire* (Military School) were built; several places and houses in considerable number were formed; churches and theatres erected; a line of boulevards formed on the south side of the river; the Petit Pont, which unites the Cité with the south bank of the river, rebuilt; the Place Louis XV. laid out; and the erection of the Pont Louis XVI. commenced. Paris was also surrounded by a wall, comprehending a much larger area than any previous enclosure, and designed to prevent the introduction of commodities without the payment of the octroi, or local taxes.

The local history of Paris during the Revolution is in fact the history of the Revolution itself, of which it was the principal scene. In 1789 (July 14) the Bastille was taken and demolished by the Parisians. In October of the same year the king was brought from Versailles to Paris by the Parisian mob, who had gone to Versailles. On the attempt of the king to quit France (21st June, 1791) some rioting took place, and in the early part of 1792 fresh commotions occurred. On the 20th June the Tuileries were attacked by the populace, and the lives of the royal family endangered; on the 10th August that palace was again attacked, and the king's Swiss guards who defended it were slaughtered; and on the 2nd of September the mob broke into the various prisons and massacred those confined in them. The king was deposed, and the Legislative Assembly gave place to the Convention, in which the more violent of the revolutionists gradually obtained the ascendancy.

The guillotine was erected in the Place or Square of Louis XV., between the gardens of the Tuileries and the Champs Elysées, and the king himself was one of the earliest victims (21st January, 1793). In June the Girondist party in the Convention was overthrown, and the faction of the Mountain became supreme. The clubs, especially that of the Jacobins, the commune of Paris, a self-elected municipal body, and the committees of the Convention, were the sources in which the violence of the popular party was shown. 'The reign of terror' now commenced; executions took place daily in the Place Louis XV.: Charlotte Corday, the assassin of Marat, the queen Marie Antoinette, Brissot, Vergniaud, and others, the most illustrious members of the Girondist party in the Convention, *Egalité*, ex-duke of Orleans, Danton and Camille Desmoulins, Mountaineers themselves, Madame Elizabeth, sister of Louis XVI., and numerous others perished. The victims at one time amounted to fifty or sixty a-day, and occasionally exceeded that number. The ground of the place of execution was for hours after the executions wet with blood. The guillotine was shifted from the Place Louis XV. to the Place de la Bastille, and from thence to the Place du Trône, at the eastern extremity of the city, from whence it was brought back to the Place Louis XV. for the execution of Robespierre and his associates (28th July, 1794), which put an end to 'the reign of terror.' The Convention, freed from the tyranny which Robespierre had established, restricted the power of the terrible committees, abolished the commune of Paris and reduced the clubs to subordination. The Polytechnic School, the Institute, and the Bureau des Longitudes owe their establishment to the Convention. In 1795 the Parisian rabble rose repeatedly against the government, but were put down by the armed force of the forty-eight 'sections,' or wards, into which Paris had been divided. In October, 1795, this armed force itself rose against the Convention, but was completely defeated by the troops of the line at Paris, commanded nominally by Barras, but really by Bonaparte. The government of France now passed into the hands of the two legislative councils and the executive directory. In February, 1796, a new municipal government was given to Paris, or rather twelve governments, one to each of twelve districts into which it had been divided. The year 1799 was marked by another tumultuous revolution effected by Bonaparte, with the aid of the military and of a party both in the executive directory and the two legislative bodies. Bonaparte, successively first consul and emperor, became the virtual head of the nation, and under his vigorous and able government Paris enjoyed almost uninterrupted quiet till the year 1814. Under the government of Bonaparte, Paris was greatly improved.

Paris was taken 30th of March, 1814, by the allied forces under the command of Prince Schwartzenberg, who was accompanied by the allied sovereigns. A gallant defence was made by the troops of the line in garrison, supported by the national guard, and the students of the Polytechnic and Veterinary Schools. The authorities in command of the city capitulated, and on the 31st the allied sovereigns and their troops entered, amidst every mark of welcome by the people. Napoleon was dethroned and the Bourbons restored. Next year Napoleon returned (20th March), and was received by the military at Paris with general joy, but the defeat of Waterloo brought the allied English and Prussian armies, under Wellington and Blucher, before the city. The troops in garrison amounted to 40,000 or 50,000, besides national guards and volunteers, who entered into a convention (3rd July) to quit Paris and retire behind the Loire. On the 8th of July, Louis XVIII. re-entered Paris, and the Bourbon government was restored. A long interval of tranquillity followed, but in November, 1827, on the election of liberal deputies at Paris, considerable riots took place; barricades were formed, which were taken and overthrown by the gendarmerie and troops of the line. In 1830 came the Revolution of the three days (27th, 28th, and 29th of July, which overthrew the Bourbon dynasty, and established that of Orléans. In this memorable struggle above four thousand barricades were formed, and the relaying of the pavement torn up for this purpose cost 250,000 francs, or above 10,000*l.* Of the Parisians, 788 were killed and about 4500 wounded. The troops and gendarmerie appear to have lost about 75 killed and 300 wounded. They were commanded by Marshal Marmont, duke of Ragusa.

In October, 1830, a mob arose to demand the death of the ex-ministers (Polignac and his associates) then on their trial, but it was put down without difficulty. In December, fresh troubles were excited by the sentence on the ex-ministers not being capital, but these also were easily repressed. In 1832, on occasion of the funeral of General Lamarque (5th June), the republican party made a more serious attempt at insurrection. Barricades were raised, and the insurgents mastered by force or art several of the smaller posts of the military, but the troops of the line and the national guard were too strong for them, especially as the bulk of the citizens did not sympathise with the rioters. Since that period Paris has been several times troubled by commotions, though of small importance, and by repeated attempts to assassinate the king.

The limits of Paris are defined by the wall erected (for fiscal purposes) in the reign of Louis XVI.; the outline thus formed, though broken by many irregularities, approximates to an oval, having its longer diameter, from west-north-west to east-south-east, about 5 miles, and its shorter diameter 3¾ miles. The included area is about 8600 acres, or 13½ square miles. The number of barriers or entrances through this wall was 60 in 1825, but several have been walled up, and in 1830 they were reduced to 50. (*Paris and its Historical Scenes.*) Most of these 'barriers' have toll-houses attached to them, at which the octroi, or local duties on goods entering the capital, are levied. Round the wall of Paris, on the outer side, is a road, planted with fine rows of trees, forming what is termed the 'boulevards extérieurs,' or outer boulevards. The circuit of the wall and of its accompanying boulevards is rather more than 15 miles. This circuit is skirted nearly on all sides by heights, so that the site of the city is a natural hollow.

The present enclosure of the city walls comprehends several portions, which, as being without the walls demolished by Louis XIV., were designated faubourgs, or suburbs, and which still retain that name. Some villages, formerly distinct, but which had acquired, by the gradual extension of the city, the character of suburbs, are also comprehended within the present boundary, and give name to particular quarters. Of these suburbs and quarters the following are the principal:—On the west, Chaillot, adjacent to the Champs Elysées; on the north-west, the Faubourg St. Honoré and the Faubourg du Roule; on the north, the Chaussée d'Antin (one of the handsomest and most regularly built quarters in Paris), the Faubourg Montmartre, the Faubourg Poissonnière, the Faubourg St. Denis, and the Faubourg St. Martin; on the north-east, the Faubourg du Temple; on the east, the Faubourg St. Antoine: all these are on the right or north bank of the Seine. On the opposite bank, in the south-east part of the city, is the Faubourg St. Victor; on the south part are the Faubourgs St. Marcel, St. Jacques, and St. Michel; and in the south-west are the Faubourg St. Germain and the quarter of Gros Caillou. The character of suburbs now more properly belongs to the villages and hamlets which surround Paris on the outside of the wall, such as Passy (pop. 4565), on the east; Montmartre (pop. 4630) and La Villette (pop. 4999), on the north; Belleville (pop. 8179), Menilmontant, and Charonne, on the east; Montrouge (pop. 3847), on the south; Vaugirard (pop. 6695) and Grenelle (pop. 1647), on the south-west. The population of these villages is from the census of 1831.

The Seine passes through Paris in its course from the south-east to the west side of the enclosure, dividing the city into two unequal parts, that on the north side of the river being by far the larger. In the river are three islands; there were originally five, but the two westernmost have been united, as already noticed, to the adjacent island of La Cité. The island of La Cité, and that of Notre Dame, now St. Louis, are occupied by buildings; the remaining and easternmost island, that of Louvier, is occupied as a depôt for fire-wood. The banks of the river and of the islands of La Cité and St. Louis are (with one slight interruption) occupied by stone quays, furnished with parapets, and forming broad and continuous lines of street, with stone stairs at different parts. There are at different intervals wharfs or places for landing goods, termed by the French 'ports.' The river is crossed by numerous bridges, connecting the banks with each other, or with the islands, or the islands one with another. These bridges are of various materials; one is of wood; the others are of wood and iron, stone and iron, or stone, or they are chain bridges.

The Pont Neuf, which crosses the two arms of the Seine with the intermediate portion of the isle of La Cité, scarcely exceeds the new London bridge or the Southwark bridge in length, and falls considerably short of Waterloo or Westminster: the other bridges are scarcely half the length of the Pont Neuf.

The central part of the town, which is by far the oldest, has narrow and crooked streets, skirted with tall gloomy-looking houses, chiefly built of stone. The outer parts of the town are more regularly laid out. The greater part of the streets have no foot-pavement; and instead of a kennel on each side, with a raised causeway between them, as in London, there is only one kennel, in the middle of the street. In lighting, as well as in cleanliness, the streets of Paris are far behind those of London. Great improvements have however been made of late years; many 'passages' have been opened, paved with flag stones, for pedestrians only; some of the more modern streets are provided with 'trottoirs,' or foot pavements, and 'trottoirs' have been gradually extending in those of the older streets which are wide enough to admit of them. Some streets are lighted with gas; but the common mode of lighting is by lamps, supported on ropes swung across the street, between the opposite houses. The boulevards (sometimes distinguished as the boulevards intérieurs) are a line of streets, forming a circuit of smaller extent than the city wall. They indicate, on the north of the river, the line of the ramparts and ditches demolished and filled up by Louis XIV.; on the south side they are of later date, and take a wider circuit than the antient walls. They are planted throughout with alleys of trees, and the northern boulevards are the gayest thoroughfares in Paris.

The largest of the places or squares is that of Louis XV., or La Concorde; the other principal places are the Place Vendôme, the Place des Victoires and the Place du Trône (both circular), the Place du Carrousel, and the Place Royale. These 'places' are not commonly occupied by gardens, like the squares of London; but some of them are adorned with columns, statues, fountains, or other decorations. There are several public gardens and walks, as the gardens of the Tuileries, the Luxembourg, and the Palais Royal; the Champs Elysées (Elysian Fields), the Avenue de Neuilly, and the numerous avenues in the neighbourhood of the Ecole Militaire, which are streets or roads lined with alleys of trees, like the boulevards. The Champ de Mars is a very large enclosure, attached to the Ecole Militaire, and used for reviews; the Esplanade des Invalides is a garden or pleasure-ground extending from the Hôtel des Invalides to the bank of the river.

Architecture.—Philippe Auguste during his long reign (1180-1223) did much for improving and fortifying Paris: he enlarged the old château of the Louvre, first founded by Dagobert about the middle of the seventh century, and rebuilt by Louis le Gros about 1110. Yet excepting Notre Dame (commenced in the early part of the eleventh century, and whose portal or west front is supposed to have been completed in the time of Philippe Auguste, although other portions are of later date), and one or two other ecclesiastical structures, there is little even in the older parts of the city of earlier date than the reign of Francis I. (1515-1547).

Of Paris at the close of the fifteenth century the architectural physiognomy is graphically sketched by Victor Hugo, in that chapter of his 'Notre Dame' which is entitled 'Paris à vol d'oiseau.' Francis I. caused the antient Louvre to be demolished and a new palace begun from the designs of Pierre Lescot, of whose work there is now remaining that portion of the interior court which has been named the Old Louvre, in order to distinguish it from the vast additions made by Louis XIV. Still, although many of the older parts of the city date from the middle of the sixteenth century, it is hardly before the beginning of the eighteenth that Paris generally began to show itself at all in its present state. The Revolution caused the destruction or suppression of many churches and convents, some of which have since been converted to secular uses. Policy as well as ambition prompted Napoleon to endeavour to efface all traces of the revolutionary period; and most certainly Paris is greatly indebted to him not only for many embellishments and architectural monuments, but more especially for extensive plans of general improvement, and many works of public utility. The erection of spacious and convenient covered markets, of public abattoirs, or slaughter-houses, of several new bridges across the Seine, and fifteen additional public fountains, besides the formation of the Canal de l'Ourcq, for the purpose of supplying the capital more abundantly with water, are among the useful works of his reign. Again, the clearing the quays along both banks of the river from many erections that disfigured and obstructed them; the opening the noble avenue of the Rue Castiglione into the Place Vendôme; the Rue Rivoli, &c., together with the introduction of trottoirs or foot-pavements, were of very great public utility. The architectural projects first commenced by Napoleon have been since carried on with more or less vigour and spirit, and the reign of Louis Philippe has been one of great activity in that respect. The completion of the Madeleine and the Arc de l'Etoile, of the Ecole des Beaux Arts, and the Hôtel de la Quai d'Orsay, the erection of several new churches, and the extensive works now in progress both at the Palais de Justice and the Hôtel de Ville, the new halls and museums of the Louvre, and many other public works, bear testimony to the encouragement given to art by the present king of the French. Private enterprise has also done much of late years both for the embellishment and improvement of the capital; and a vast number of handsome private houses have been erected, in some places forming almost entirely new districts, and a new branch of architecture and decoration has been displayed in cafés and shops, many of which are fitted up in the most sumptuous manner. In some of them not only gilding but colouring is extensively employed, and occasionally with much taste; nor are paintings in the Pompeian style, with figures or allegorical subjects, by any means uncommon. The numerous Passages, or covered avenues of shops, similar to the Lowther Arcade in London, may likewise be reckoned among the modern improvements of the French capital; of which the Passage Colbert and one or two others possess considerable architectural beauty.

Before making a few remarks on some of the principal buildings of Paris, we shall briefly point out some of the leading characteristics of the French capital as compared with our own. The Thames at London is a nobler river than the Seine at Paris, and its bridges, though not so numerous, are greatly superior to those across the latter river. On the other hand, the quays along both banks of the Seine, lined in many parts by stately ranges of buildings, give Paris in that respect a decided superiority, the Thames being quite blocked with warehouses, or wharfs, &c., in such manner that the view from any of [illegible] bridges presents only a confused mass of mean or [illegible] erections, and even the terrace and river front of Somerset-house produce comparatively little effect. Fountains, though it must be admitted that most of them are too poor to be [illegible] embellishments, are features unknown to London, as are likewise the Boulevards and the Barriers of the French capital. These last, about sixty in number, were erected between the years 1783-9, after the designs of Ledoux. Several of these structures exhibit much originality, and picturesqueness, in their ensemble, but they also betray great want of study in regard to finish and detail. One of the most striking of them, the Barrière St. Martin (now converted into a barrack or guard-house) is a square of about 80 feet, with an octastyle portico of square columns on each of its four fronts, and above this rises a large circular mass 74 feet in diameter, surrounded below by an open arcade of twenty arches (resting upon coupled columns), and as many semicircular windows over them. Pleasing as this architectural mass is on account of its variety, it will not bear critical examination. This and one or two other barrières are given in Legrand and Landon's 'Description de Paris et de ses Edifices,' which, though it has some defects, is an interesting and convenient architectural manual.

In consequence of the changes they have undergone at different times, and of various architects having been employed upon them, the history of some of the buildings of Paris is rendered very perplexed; nor is such difficulty lessened by the repeated changes of names; for instance, what is now the Pont des Invalides was at first called the Pont de Jena, &c. In some cases too political changes have led to more than the mere alteration of names. The costly monumental chapel erected in honour of the Duc de Berri was taken down again after the July revolution, before it was actually completed, instead of being converted to some other purpose.

Travellers and tourists have generally despatched the architecture of Paris very summarily in a few random remarks on the more commonly known buildings. The older parts of the capital are almost unknown to the generality of those who visit it, although they are well worthy of being explored by the artist and antiquary; for if there be a great amount of ugliness and deformity, there is also abundance of the picturesque, together with no little variety. In this latter respect indeed Paris offers many singular contrasts, such as the Eglise de la Visitation, or the Val de Grace, and the Chapelle Expiatoire; the Tuileries, and the portico of the Chamber of Deputies; or the *Neo-Grecian* structure of the Madeleine; in short, extravagant licentiousness of taste, amounting almost to barbarism in some buildings, and scarcely amounting to pedantic affectation in others. Their admiration of the *classical* however has not induced modern French architects to adopt the Grecian orders; the small tetrastyle portico in the court of the Hôpital de la Charité, erected by Antoine about the middle of the last century, is almost the only example of Grecian Doric. It is therefore the Roman style—for the Corinthian can hardly be said to be *Greek* at all—that prevails in the modern structures of Paris. We see it in the Pantheon, the Bourse, and the Madeleine; and if columns alone be allowed to constitute architecture, the second of these buildings may rank much higher than criticism can possibly place it; since, with the exception of the columns, it is not even Roman or antique at all in character, but a formal affectation, wherein, instead of being skilfully blended together so as to produce consistency of style, very opposite elements and modes of architecture are allowed to show themselves.

To proceed to particular buildings, we begin with the cathedral of Notre Dame, the construction of which, says Woods in his 'Letters of an Architect,' 'may be considered as among the boldest and most successful existing in Gothic architecture.' To an English eye however it does not appear the most pleasing specimen of that style; the western front indeed is even disagreeably compact and heavy in its general *form*, probably in consequence of the design not having been completed, since we may presume it was originally intended to crown the two towers by spires. There are many other parts which have evidently *never* been finished, the consequence of which is, that there is a disagreeable contrast between the elaborate richness of some features in the building and the meagreness of the rest. For a detailed description of the whole edifice we must *refer* to that given by Mr. T. Moule, in Weale's 'Continental Cathedrals,' limiting ourselves here to a *few* particulars of its plan and dimensions. The extreme length externally is 430 feet; do. breadth 162; breadth of nave 40, length of do. to transept 156, transept 148, width of front 134, and height of towers 221 feet. The plan is divided into a nave and four aisles, besides a range of seven chapels on each side between the external buttresses; consequently the projection of the transept, or form of the cross, does not show itself at all in the lower part of the building. Still, notwithstanding its greater magnitude, the interior is *frequently* estimated by English travellers as being much less than that of Westminster Abbey, which is probably because they judge chiefly *from* the effect of the naves in the respective buildings.* In the richness of plan produced by the additional aisles and chapels connected with them, the interior of Notre Dame must be allowed to surpass the Abbey, but the latter is superior in point of style, while Henry VII.'s chapel has no parallel in the French capital. During the Revolution, Notre Dame suffered considerable injuries, which have since been repaired under the direction of M. Godde, the architect now employed on the Hôtel de Ville.

If our Westminster Abbey has a rival in Notre Dame, the same cannot be said of our St. Paul's, since Ste. Geneviève, or the Pantheon, falls very far short of the latter, although a work of great merit; of infinitely more, in fact, than a modern French writer (Victor Hugo) has allowed. Very different is the opinion of an able architectural writer (Woods), who says, 'It is certainly a beautiful edifice, the general proportions are good, and there is much grace and elegance in the outline, but there are also many defects.' Compared with the church of the Invalides the exterior presents a totally different style of design, and one marked by grandeur and simplicity. Instead of two small orders so disposed as to create confusion, a single large one, whose columns are sixty feet high, forms a Corinthian hexastyle crowned by a pediment filled with sculpture; there are however twelve other columns, besides four attached ones, for the arrangement of which, as it is not very easy to describe, we refer to PORTICO. The entablature is continued along the whole building, of which it constitutes almost the sole decoration, there being no windows, as the interior is lighted by the dome, and by large semicircular windows above the internal colonnades, which are not visible externally. Hence it has been objected that the sides of the edifice look too plain and bare in comparison with the portico and dome; yet although somewhat more of embellishment would be an improvement, the absence of windows and the extent of unbroken surface give by contrast additional value and relief to the two principal features. The lower part of the dome is encircled by a Corinthian peristyle of thirty-two columns 36 feet high, on an unbroken podium, or stylobate. The interior is a Greek cross in plan, the length from east to west being 295 feet, that of the transept 262, and the breadth uniform, namely, 104. Instead of pier-arches, the aisles are formed by insulated Corinthian columns 40 feet high, thereby producing an air of great richness and lightness. The dome having been described elsewhere, and a section of it given, we refer for an account of it to DOME, pages 68 and 79, where will also be found a notice of that of the Invalides. The total length of the Pantheon, including the portico, is 362 feet.

The new church of the Madeleine, if in some respects superior to the first-mentioned edifice, in others falls short of it, and having no dome, it does not, like that, form a conspicuous object from a distance. Externally, it is merely the model of a Corinthian peripteral temple, upon a noble scale, and so far a very fine piece of classical architecture, perhaps the most imposing in magnitude and the most chaste in character ever produced in modern times.† The dimensions are 328 feet by 138 (those of the Parthenon, only 228 by 100), independently of the projection of the flights of steps at each end, which make the total length of the base or substructure 418 feet; the stylobate, on which the columns are raised, is about 13 feet high; the height of the columns 62; that of the entablature nearly 14, and the entire height from the ground to the apex of the pediment 115 feet. There are in all fifty-two columns; therefore as the porticoes are octastyle, there are eight at each end, and twenty along each side, those at the angles being reckoned again. The door of the south or principal entrance is 32 feet high by 16 wide, and is of bronze, with ten pannels sculptured in relief by Triquetti, with subjects bearing allusion to the Ten Commandments. The interior measures 259 feet by 52, and consists of three compartments in length, covered by as many flat domes, through which the building is lighted, there being no side windows. The roof is entirely of iron and copper, and it is said that no timber has been used in the construction of any part of the building.

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* In the English one the width of that part is 38 feet, and its length to the transept 200; whereas in the other they are 42 and 195; consequently in the first the proportional length is very much greater, besides which that effect is increased by a greater number of divisions or arches, namely, twelve in the nave of the Abbey, while there are only ten in that of Notre Dame. To facilitate comparison we here subjoin some other measurements of the Abbey: extreme length, including Henry VII.'s chapel, 530 feet; length of chapel 110, width of trans. 110, height of towers, including pinnacles, 225.

† The Town-hall at Birmingham may be quoted as an instance of an octastyle Corinthian peripteral, at least so far as regards the front and sides, for the columns are not continued at the other end; but it is by no means a happy application of such an arrangement, the effect of the colonnades being greatly impaired by the large and numerous windows within them. Besides this the order is raised not on a solid stylobate, but on a lofty basement, pierced with arched doors and windows.

The Louvre, which has long ceased to be a royal habitation, though one of the noblest palatial structures in Europe, is nearly a square, of 576 feet by 538, enclosing a court 394 feet square. The celebrated east front or colonnade is in a style of simple grandeur almost unprecedented, and is so far the very reverse of the Tuileries. The fault usually alleged against it is the coupling of the columns, which is undoubtedly contrary to the practice of the antients, and consequently open to the censure of those who are guided by rules. Yet the effect itself is by no means unpleasing, or rather a peculiar species of richness is thus produced. Unfortunately the basement is not only too high and too plain for the order, which is exceedingly rich, but the size of the windows detracts considerably from the effect of the columns, while their form, which is segmental-headed, produces an offensive discord as to style. Another striking defect is occasioned by the break in the lower part of the centre division, and the large arch being carried up above the level of the basement; which has in turn occasioned one of the greatest blemishes as regards the order itself, namely, the excessive width of the central intercolumn beneath the pediment, which is much more than double any of the others—so wide as to produce the appearance of weakness and poverty of columniation where they ought to have been especially avoided: so far the centre compartment of the south front, or that towards the Seine, is in infinitely better taste. The great gallery extends from the Louvre to the Tuileries, in a line of more than 1400 feet, but the architectural effect is by no means commensurate with the extent. The interior of the Louvre has undergone repeated changes and modifications, and among recent ones are the newly decorated rooms, eighteen in number, appropriated as a museum of Egyptian antiquities, also the new museum of Spanish painters, which contains 405 pictures in five rooms.

The Luxembourg Palace, now the Chamber of Peers, was erected by Mary de' Medici, and is a good specimen of its particular style (the Florentine), where three orders are introduced with rusticated columns and pilasters. It consists of a centre and two wings, which latter are connected by a screen of arcades, in continuation of the lower order, decorated in the centre with a lofty pavilion or vestibule, in three orders, and covered by a dome, and thus enclosing the court (about 196 feet by 230) from the street. One of the most splendid features of the interior is the grand staircase leading to the hall of the Peers, executed by Percier and Fontaine; the hall, or 'chambre,' itself is a semicircle about 80 feet in diameter, lighted from the roof, and decorated with Corinthian columns.

The Chamber of Deputies, formerly the Palais Bourbon, is remarkable for the modern façade towards the river and Place de la Concorde. The whole extent of this side of the building is 236 feet, 136 of which form an advancing central mass faced by a Corinthian portico of twelve columns, leading up to which is an ascent of steps, about 15 feet high, flanked by pedestals and statues. Notwithstanding that it is only a single intercolumn in depth, this portico makes an exceedingly majestic appearance, which is not only owing to its unusual extent, and the richness of its entablature and sculptured pediment, but to the absence of what generally mars all modern pseudo-Grecian designs. No part of the façade is cut up by apertures, but consists almost entirely of lightly rusticated surface, with no other decoration than pannels filled with sculpture; while the doors within the portico occupy only the alternate intercolumns. The 'chambre,' which is behind the portico, is similar in plan to that of the Peers, being a semicircle lighted from above, and surrounded by an Ionic colonnade.

The Hôtel des Monnaies, or Mint, by Antoine, on the Quai Conti, near the south end of the Pont Neuf, is a noble structure of palatial aspect, although certainly without anything characteristic of its particular purpose. It has two fronts of nearly the same extent, 376 feet, one towards the Quai, the other in the Rue Guénégaud. The former is in three divisions, the centre one of which has an Ionic order of six columns above the basement, crowned by an attic, against which are statues over the columns and pannels between them. There are two series of windows in the height of the order, and twenty-seven on a floor. The whole is marked by great nobleness and simplicity, and is comparatively pure in taste.

Although without much architectural beauty, the Halle aux Blés, or Corn-market, merits notice for its convenience and agreeable effect of plan. It is a rotunda whose external diameter is 225 feet, containing within a circular arcade of twenty-five arches, leaving a clear central space, 127 feet in diameter, which was originally an open court, but was afterwards covered in by a timber dome, pierced with *rayons*, or oblong lights, corresponding in number with the arches below. This dome having been destroyed by fire, the present dome was afterwards constructed of iron and copper, and different also in design, there being now only a single skylight in the centre, similar to the opening in the dome of the Pantheon at Rome.*

The Bourse is an insulated building standing in the centre of a large square or *place*. The form is a parallelogram, measuring 164 feet by 234, and is entirely surrounded by a Corinthian peristyle of sixty-four columns, of which there are fourteen at each end, besides which there are two others, viz. behind the second one from each angle of the west front, the portico being there two intercolumns in depth. The columns are 40 feet high and raised upon a solid stylobate of 10 feet, and the extreme height from the ground to the top of the attic, or podium above the entablature, is rather more than 68 feet. As far as mere effect of columniation goes, this structure may be called classical, but it is by no means entitled to the praise which has been indiscriminately lavished upon it. As far as regards the general form, it is that of a Greek temple stripped of its pediments; consequently not only is a very disagreeable monotony produced, but, except the ascent at the ends, there is no marked indication of front, each side being perfectly alike, and it further appears as if it had been intended that the building should be perfectly square. There is no occasion to object to the windows, &c. within the colonnades being arched, because the number alone of those openings destroys the repose so essential to architectural dignity. Like the portico of St. Martin's Church, London, when viewed by moonlight, so that the columns alone show themselves, and all that is behind them is veiled by obscurity, the Bourse is seen to greatest advantage. According to the first design, which had the same number of columns, the order was to have been Ionic; another difference is that, at the west end at least, there would have been no second range of windows, but a long pannel with sculpture and circular reliefs on each side of it, in lieu of such windows. The interior contains several offices and other apartments, and a large central hall for the Exchange—108 feet by 59 (exclusive of the arcades or galleries by which it is surrounded on both floors), and lighted by a central skylight in the vaulted roof.

Passing by several other buildings, some of which will be found mentioned in the annexed table, we must notice three structures of a monumental class, which eclipse everything of the kind in our own metropolis—the Colonne Vendôme, the Arc de l'Etoile, and the Colonne de Juillet. The first-mentioned of these falls far short of the monument of London in magnitude, its entire height being only 132 feet, while that of the other is 202. It is indeed only a few feet loftier than the York column, and, in its general design, merely a copy of that of Trajan; but then it is a copy worthy of the original, the shaft being entirely covered with bronze reliefs, the work of thirty different artists, who executed them under the direction of Denon. The pedestal is likewise highly enriched, and it is this assemblage of sculpture which constitutes the merit and effect of the whole as a work of art, the reliefs, &c. being not so much accessory decorations to the column, as the column is the form adopted for displaying the historical sculpture. The following are the respective diameters of the Monument, York Column, and Colonne Vendôme—15 feet, 11ft. 7½in., and 12ft. 10in. In 1814 the bronze statue of Napoleon, in Roman costume, modelled by Chaudet and cast by Mesnel, was taken down, and afterwards recast to form the horse of the equestrian statue of Henri IV.; but a second bronze figure of Napoleon, in a military dress, designed by the sculptor Seurre, was put up July 28, 1833: it is 13 feet high, or about a foot and a half more than the first.

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* This spacious covered area, surrounded by a wide portico of arcades, seems to offer an excellent model for an Exchange, it being every way preferable to an open court with merely sheltered walks around it, and capable of accommodating a greater number of persons, in proportion to its area.

The Arc de l'Etoile is, without exception, the most gigantic work of its kind either in ancient or modern times; nor can we perhaps give a better general idea of its colossal dimensions than by stating that eight such structures as Temple Bar, London, would stand within the great arch, that is, four in depth and as many above them, the arch of the Etoile being 47ft. 10in. wide, 95ft. 6in. high, and 73ft. in depth. This structure is perfectly insulated, and forms a mass whose plan is 147 feet by 73, and its height 162, the effect of which extraordinary dimensions is greatly enhanced by its simplicity of form and its solidity, the outline being unbroken by columns and projecting entablatures, and there being only a single opening on each side, viz. the large arch in the direction of east and west, and the smaller one running transversely through the plan from north to south: the height of the latter is 64 feet, and the breadth 27½. There are no columns or pilasters, and the architectural forms are exceedingly simple, but at the same time prodigiously rich: the entablature is 23 feet deep, and the frieze is entirely covered with figures in relief, besides which the mouldings of the cornice are carved, as are likewise those of the archivolts and imposts of the arch. An unusual degree of decoration is also bestowed upon parts where it is often omitted altogether, namely, in the passages through the structure, where the soffits of the archivolts and the vault are richly pannelled and coffered, and the piers formed by the intersection of the smaller arch are covered with wreaths and inscriptions. If it were remarkable for nothing else, this monument would be eminently so on account of the display of sculpture, there being four colossal groups of sculpture, one on each side of the arch in the east and west fronts, the height of which, including their pedestals, is upwards of 36 feet, and that of the figures themselves about 20. Corresponding with these, and above the cornice forming the impost to the large arch, are as many large bas-reliefs. The attic also has a great deal of sculptured ornament. Within the upper part and attic there is, besides some other rooms, a spacious hall, extending from end to end of the building.

The Colonne de Juillet, erected on the Place de la Bastille, in commemoration of the second Revolution, is somewhat loftier than that of the Place Vendôme, but similar in character, yet different in construction, the bronze exterior of the shaft consisting of twenty cylindrical bands or rings, not attached by cramps, but fitted into each other by grooves. The capital is to be cast in one mass, and it is proposed to surmount the whole by a bronze statue. Since Alavoine's death, the execution has been entrusted to Lenoir and Duc.

Under OBELISK there is an account of the Luxor obelisk, now erected in the centre of the Place de la Concorde. Among other embellishments and architectural works, either recently completed or now in progress, may be mentioned the Ecole des Beaux Arts, on the quay between the Pont du Carrousel and the Pont des Arts, an edifice which partakes of the Renaissance style, and in front of which have been erected the portal of the Château d'Anet and that of Château Gaillon. There are also several other buildings, of which it would be premature to attempt to speak at present; for instance, the extensive alterations of the Hôtel de Ville, Palais de Justice, the Gothic church by Gau, in the Faubourg St. Germain, &c., as some time must elapse before they are completed. In fact every year makes some addition to the architecture of Paris.

Table of Public Buildings.

	Date.	Architect.	Remarks.
St. Germain des Prés	ded. 1163		A striking specimen of French architecture of its period. The chapel of the Virgin by Pierre de Montereau. Length 310 feet.
Notre Dame	1010-1260		Total length 442 feet.
La Sainte Chapelle	1242-8	Pierre de Montereau	A beautiful Gothic edifice, divided internally into two stories.
St. Germain l'Auxerrois			Gothic. Length 250 feet. Interior, five aisles and side chapels.
St. Severin	fin. 1495		A fine Gothic specimen.
Hôtel de Cluny	1490-1505		Now converted into a museum.
St. Mary	1520		Gothic.
St. Eustache	1532-42		Interior Gothic.
——— façade	1754	Mansard de Jouy	Two loggie, Doric and Ionic, and two towers, Corinthian.
Fontaine des Innocens	1551	Lescot and Goujon	Now insulated, and forming an upright square pavilion, covered by a dome, and having a large open arch on each side. Remarkable for the beauty of the sculptures.
Hôtel de Ville	1533-1606		Front a singular and uncouth architectural mixture.
Old Louvre	1530-48	Lescot	Profusely adorned with sculpture.
St. Etienne du Mont	1517		Interior Gothic.
——— façade	1610		A barbarous medley, though rich in parts.
Tuileries	1564	Delorme & Bullant	Not only vicious, but positively ugly as to style, nevertheless grand and imposing; garden façade nearly 1100 feet.
Pont Neuf	1578-1610	Du Cerceau	Length 926 feet. Twelve semicircular arches. In better style than any of the later bridges.
St. Gervais	1581		
——— façade	1616	J. Debrosses	A lofty mass, about 140 feet high, Doric and Ionic, with a third order, Corinthian, over centre.
Palais de Justice			
Palais du Luxembourg (Chambre des Pairs)	1614	J. Debrosses	Three orders rusticated; coupled columns; stately in character. Interior greatly altered by Chalgrin, &c. The Chamber of Peers, a semicircle 80 feet in diameter.
Val de Grace	1645	Fr. Mansard	A preposterous composition; façade in two orders, with pediments to both. Dome of enormously lofty proportions, the height being 177 feet, and diameter only 66.
Église de Sorbonne	1650-3	Le Mercier	Hexastyle Corinthian portico; octagonal dome.
Collége Mazarin (Institute)	1663	Levau	Corinthian portico; four columns, those at the angles coupled with a pilaster. Dome with coupled pilasters and arched windows between them.
Observatory	1667-72	Perrault	
Louvre, East front	fin. 1670	Perrault	Length 576 feet; façade in five divisions, centre and two pavilions connected by Corinthian colonnades of coupled columns, forming seven intercolumns each.
Assumption, Church	1670-6	Errard	A rotunda of singular proportions, diameter 78 feet, height to top of dome 144 feet. Low façade, with hexastyle Corinthian portico.
Porte St. Denis	1672	Blondel	A structure marked by simplicity and grandeur. Width 82 feet, depth 22 feet, height 85 feet.

	Date.	Architect.	Remarks.
Porte St. Martin	1674	Bullet	A simple and well proportioned mass, crowned by a handsome entablature, and an attic. Width 56 feet, height 60
Hôtel des Invalides	1675	Lib. Bruant	Style exceedingly heavy and bad. Façade 650 feet. Court 360 feet by 230.
—— Dome	1706	J. H. Mansard	Total height 292 feet, dome gilded.
Place des Victoires	1685	J. H. Mansard	Nearly a circle, 260 feet diameter.
Place Vendôme	1699	J. H. Mansard	Uniform elevations, a Corinthian order on arcades. A square of 430 feet, with angles cut off.
		Eighteenth Century.	
Palais de l'Elysée	1718	Mollet	
Palais Bourbon (Chamber of Deputies)	1722	Girardini	An extensive pile greatly altered and extended at different times. Hall of Louis Philippe added by Joley about 1836
St. Sulpice, façade	1733	Servandoni	Two orders, Doric forming a loggia, Ionic on lofty pedestal with arcades between the columns. Two towers.
St. Roche, façade	1736	De Cotte	Two orders, Doric and Corinthian.
Fontaine de Grenelle	1739	Bouchardon	A showy architectural façade.
Ecole Militaire	1752	Gabriel, J. A.	Façade towards the Champ de Mars, 340 feet, centre a Corinthian tetrastyle.
Garde-meubles	1760	Gabriel, J. A.	Two duplicate façades towards the Place de la Concorde.
Halle aux Blés	1762	Camus de Mezieres	A low rotunda 228 feet diameter. What was originally an inner circular court, 127 feet diameter, was covered by a timber dome, by Legrand and Molinos, 1782, which, being burnt, was replaced by the present metal one, 1806, by Bellanger.
Ste. Géneviève (Pantheon)	1764	Soufflot	Portico 18 Corinthian columns (62 feet high), disposed in front as an hexastyle.
École de Chirurgie	1769	Gondouin	Greatly praised, but in many respects very poor. Almost the only good feature is the Corinthian hexastyle portico within the court.
St. Philippe du Roule	1769-84	Chalgrin	By far the most tasteful specimen of church architecture of its period.
Mint	1771	Antoine	Remarkable for its simple grandeur of character.
Palais de Justice	1777	Moreau, &c.	The new front and court.
La Madeleine	1777	Contant d'Ivry	The building first begun at this period, but quite altered by succeeding architects.
Hôtel Thelusson	1780	Ledoux	Remarkable for the rusticated mass (forming the entrance) pierced by a single low arch 30 feet wide.
Palais Royal, street façade	1781	Moreau	Insignificant in style. The ranges of buildings and arcades towards the garden were erected about the same time.
Lycée Bourbon	1781	Brogniart	A façade of unusual simplicity and elegance with three large doors, niches and bas-reliefs; no windows.
Théâtre de l'Odéon	1782	Dewailly and Peyre	The façade has more of a disagreeable affectation of severity than of either beauty or propriety.
Théâtre Italien (Favart)	1783	Heurtier	At one time greatly admired for its portico or hexastyle Ionic colonnade, though poor in style and without merit as a composition. This structure was burnt down in 1836.
Hôtel de Salm (Palais de la Legion d'Honneur)	1786	Rousseau	Its chief architectural merit, the gateway and Ionic screen of two rows of columns on each side of it.
Pont Louis Seize	1787-90	Perronet	A stone structure of five flat arches; length 1065 feet.
Opera House (Académie de Musique)	1791		Front two orders, Doric and Ionic, with 9 arcades in each.
		Nineteenth Century.	
Rue Rivoli	1802	Percier	
La Madeleine	1804-36	Vignon, Huvé, &c.	A Corinthian peristyle of 52 columns (8 at each end) 62 feet high, raised on a stylobate 13 feet high.
Pont des Arts	1804	Cessart & Dillon	For foot-passengers only: arches cast iron, piers stone.
Arch of the Tuileries	1805-10	Percier & Fontaine	Each front has four Corinthian columns (shafts red marble, and bronze capitals), with a central arch and two smaller ones.
Vendôme Column	1806	Gondouin & Lepère	Stone cased with bronze reliefs; total height 141 feet.
Arc de l'Etoile	1806-36	Chalgrin, &c., finished by Debret	Width 147 feet, height 162 feet, depth 73 feet. Arch 47 feet wide, 96 feet high.
Pont des Invalides (Pont de Jena)	1806	Lamandé	Five arches, length 518 feet.
Fontaine du Palmier	1806-8	Bralle	A column on a pedestal, surmounted by a figure of Fame on a globe. Height to top of capital 49ft. 3in.; total height, with statue, 56 feet.
Portico, Chamber of Deputies	1807	Poyet	A single range of twelve columns (44 feet high) beneath a pediment.
Bourse	1808-1824	Brogniart and Labarre	A Corinthian peristyle of 64 columns (40 feet high), 14 at each end.
Hôtel des Affaires Etrangères (Quai d'Orsay)	1810-1837	Bonnard and Lecointe	An extensive pile, of which the projecting portion forming the façade towards the quay is 370 feet, and consists of two orders, Doric and Ionic, surmounted by an attic, and each containing 19 large arcades or windows.

	Date	Architect	Remarks
Halle aux Vins	1811-13	Gaucher	
Bondy Fountain	1811	Girard	A large circular basin 90 feet in diameter, with other basins or terraces rising from it.
Marché St. Germain	1813	Blondel, M. J. B.	
Chapelle Expiatoire	1815-26	Percier & Fontaine	Tetrastyle portico, Roman Doric attached to a square mass, whose three other sides have semicircular projections crowned by semidomes against the attic of the square part.
École des Beaux Arts	1824-37	Duban and Labrouste	Two Corinthian orders (one in columns, the other in pilasters), upon a basement. The gateway or screen from Château Gaillon, erected in front of the building.
July Column	1833	Alavoine	Pedestal stone, column bronze, total height 154 feet; 13 feet higher than the Vendôme Column.
Pont du Carrousel	1834-6	Polonceau	Timber and iron, with stone piers and abutments. Three arches, centre one 157 feet span, and 16½ rise. Total length 338 feet.
Palais de Justice	1834		Interior remodelled and rebuilt chiefly in the Renaissance style.
Hôtel de Ville	1835	Godde and Lesueur	Restorations, &c. Renaissance style.
Luxor Obelisk	1836		Raised by Lebas, October 25.
Place de la Concorde		Hittorff	Embellished with fountains and architectural decorations.
Notre Dame de Lorette	1823-36	Lebas	Portico, tetrastyle Corinthian.
St. Vincent de Paul		Hittorff and Lepère	
[illegible] Bonne Nouvelle	1837	Froehlicher and Grisart	
Church, Faubourg St. Germain	1839	Gau	Gothic.

The population of Paris at the end of the reign of Louis XVI. (1791) has been estimated, by a calculation founded on the number of births, at upwards of 610,000. The troubles of the Revolution, and the emigrations consequent thereon, must have materially diminished the number; but on the comparative quiet which followed the overthrow of Robespierre, it is probable that the diminution was checked. The calculations formed in the years 1798-1800 exceed that of 1791; but these calculations can only be regarded as loose approximations, for upon the institution of a regular census in 1806-1808, the population, exclusive of the military, was shown to be only 580,609. The next census appears to have been in 1817, when a deficient harvest had led many destitute persons to resort to Paris. There were then ascertained to be *26,751* houses, and 224,922 families, comprehending 657,172 individuals. The hospitals, military establishments, prisons, hotels, and other places for individuals not domiciliated, contained 57,424 persons; making a total of 714,596, of whom no less than 100,000 (in round numbers) were prisoners, inmates of hospitals, or persons receiving charitable relief. (Dulaure, *Hist. de Paris.*) In 1826 the population was 890,431; in 1831, 774,338; and in 1836, 909,125. The extraordinary diminution in the return for 1831, as compared with the preceding return for 1826 and the succeeding return of 1836, was probably owing to some unnoticed variation in the districts included in the return. A remarkable feature in the return for 1817, and which may be considered as applying to the subsequent returns, is the number of families as compared with that of houses. The inequality is accounted for by the vast height of the houses, which are sometimes of eight stories in the older parts of the town, and by the practice of different families occupying suites of apartments in the same house, a practice not confined, as in London, to the humble classes, but common, as in Edinburgh, to all ranks.

The students of various classes form a considerable part of the population of Paris; and in the political excitement which preceded and followed the Revolution of 1830, they acted a very conspicuous part. In 1828 the Académie Universitaire, or University of Paris, was attended by from 7000 to 8000 students; it is the most frequented university in the world. The other institutions for superior education were also attended by a great number of students, swelling the total number to nearly 15,000. There is also a considerable manufacturing population; for in the variety and extent of its productions of industry, Paris may vie with most cities of the world. The carpets of the manufactory of La Savonnerie and the tapestry of the Gobelins are well known. The two establishments are now united at the Gobelins. Cashmere, silk, and woollen shawls; light woollens, cotton goods, hosiery, gloves, hats, embroidery, lace, and other articles of fashionable attire; jewellery, gold and silver plate and trinkets, clocks and watches, bronzes, and musical, mathematical, and philosophical instruments; paper-hangings, household furniture, carriages, saddlery, leather, glue, cutlery, fire-arms, liqueurs, and confectionary are made. Dyeing, printing, engraving, and lithography; the manufacture of salts, acids, oxides, and other chemicals; the refining of sugar, tallow-melting, the distillation of brandy from potatoes, brewing, and the manufacture of potato-starch, are carried on with considerable activity. The number of periodicals published is estimated at 300. The trade of the place comprehends the above-mentioned articles and others requisite for the supply both of the town itself and the district of which it is the emporium. The great manufactures of Lyon, Rouen, and the other chief manufacturing towns of the provinces, have their agencies and their dépôts at Paris. The Seine furnishes the principal means of water-carriage: it is navigable for barges and other small craft. The canal of the Ourcq, which opens a communication with the country to the north-eastward, terminates in the basin of La Villette, just outside the wall of Paris, on the north-east side of the city; and the canals of St. Martin and St. Denis open a communication between the canal of the Ourcq and the Seine. The canal of St. Martin enters the Seine in the very heart of Paris, opposite the island Louvier: its termination toward the Seine is formed by the *gare* (basin or dock) of the Arsenal. The canal of St. Denis opens into the Seine at the town of St. Denis, a short distance north of Paris in the direct line, but a much greater distance following the winding of the river.

In 1824 and 1825 about 15,000 or 16,000 barges and other craft arrived at Paris, besides trains of fire-wood or timber floated down the main stream, or its affluents the Marne and the Oise. Wood is the principal fuel consumed at present, but the consumption of coal is gaining ground. The principal articles conveyed by the river in boats are wine and brandy; grain, pulse, and flour; butter, fish, and fruit; groceries, spices, salt, and oil; hay and straw; bricks, tiles, and stone; cotton, linens, and other woven goods; iron and other metals; earthenware and glass; soap, tobacco and snuff, soda, drugs, paper, &c. For the supply of provisions there are numerous markets, covered or open. The corn-market (*Halle aux Blés*) is in the neighbourhood of the Louvre. The principal granary, known as the *Grenier de Réserve*, extends along the side of the gare (or basin) of the Arsenal, which opens into the Seine: it is an immense building, commenced by Napoléon, but never finished to the extent at first proposed. It is above 1100 feet in length.

and about 75 feet high. The basement is a storehouse for wine and oil. Napoléon designed to erect a large covered meat-market (*Halle à la Viande*) near the *Halle aux Blés*. The space cleared for the purpose (about 360 feet by 175 feet) has been fitted up with wooden stalls, and is appropriated as a market-place for meat: it is supplied with water by six fountains fixed against the wall (*bornes-fontaines*). The poultry-market (*Marché à la Volaille*) is on the south bank of the Seine, opposite La Cité. It is a covered market, about 200 feet long and 150 wide, divided into three parts by rows of pillars and iron rails. The fish-market, near the *Halle à la Viande*, or meat-market, is a covered building, supported by a great number of columns. The *Marché des Innocens*, for fruit, vegetables, and flowers, is an open square in the same neighbourhood, surrounded by small shops for the market-people, and adorned in the centre by a handsome fountain. The *Marché St. Germain*, not far from the Luxembourg Palace, is the largest and best constructed market in Paris: it is an open square of about 300 feet long by 240 or 250 feet wide, with a covered arcade or piazza all round, and having a fountain in the centre. There are vast cellars. The *Halle aux Vins*, or wine depôt, on the south bank of the Seine, opposite the islands St. Louis and Louvier, is a vast enclosure, comprehending extensive covered storehouses for wines and ranges of cellars. Besides the above there are several other markets, and some halls designed for the sale of other articles than provisions, as the wool depôt, the cloth-hall, the leather-hall or skin-market, &c. There are five abattoirs, or general slaughter-houses, in the outskirts of the city, three on the north side of the Seine, and two on the south side, commenced by Napoléon, and finished under the Bourbons: they are of great extent, and under excellent regulation.

A considerable part of the southern quarters of Paris (including the Luxembourg Palace, the churches of Ste. Géneviève and St. Sulpice, and the Observatory) stands on excavations from which the stone was procured for the building of the city. A part of these excavations is occupied by the catacombs, or depositories of the bones brought from the disused cemeteries in the heart of Paris. Nearly all the present burial-places are without the enclosure of the city walls; that of Mont Louis, better known as the cemetery of Père La Chaise, on the north-east side of the city, is the principal.

The offices of the general government and the buildings connected with it are numerous. Paris is the residence of the king, who has the palaces of the Tuileries, the Louvre, and the Palais Royal; and the seat of the legislature, of which the Chamber of Peers meets in the Luxembourg palace, and the Chamber of Deputies in a building annexed to the Bourbon palace. The hôtels, or the offices of the executive government, are chiefly in the neighbourhood of the Tuileries; the chief courts of law are held in the Palais de Justice, in the island of La Cité. The Cour de Cassation is the supreme law court of the kingdom. The Cour Royale of Paris has jurisdiction over the departments of Seine, Seine et Oise, Seine et Marne, Aube, Eure et Loir, Marne, and Yonne. The head-quarters of the first military division, which includes the departments of Seine, Seine et Oise, Seine et Marne, Aisne, Oise, Loiret, and Eure et Loir, are also at Paris.

For the purposes of municipal government, Paris is divided into twelve parts, called 'arrondissemens,' which are subdivided each into four 'quartiers' (quarters), as follows:—

Arrondissemens.	Quartiers.
I.	Du Roule, des Tuileries, des Champs-Elysées, de la Place Vendôme.
II.	De la Chaussée d'Antin, de Feydeau, du Palais Royal, du Faubourg Montmartre.
III.	Du Faubourg Poissonnière, de Montmartre, de St. Eustache, du Mail.
IV.	De St. Honoré, des Marchés, du Louvre, de la Banque de France.
V.	De Bonnes Nouvelles, du Faubourg St. Denis, du Faubourg St. Martin, de Montorgueil.
VI.	Du Temple, des Lombards, de la Porte St. Denis, de St. Martin-des-Champs.
VII.	Des Arcis, de Sainte Avoye, du Mont-de-Piété, du Marché St. Jean.
VIII.	Des Quinze-vingts, de Popincourt, du Faubourg St. Antoine, du Marais.
IX.	De la Cité, de l'Arsenal, de l'Ile St. Louis, de l'Hôtel de Ville.
X.	Des Invalides, de la Monnaie, de St. Thomas d'Aquin, du Faubourg St. Germain.
XI.	Du Luxembourg, du Palais de Justice, de l'École de Médicine, de la Sorbonne.
XII.	De l'Observatoire, de St. Jacques, du Jardin des Plantes, de St. Marcel.

Each arrondissement has a separate mairie, or municipality, over which a maire (mayor) presides. There is also a justice of the peace to each of the twelve arrondissements, who sits at the public office of the arrondissement; and a commissary of police to each of the forty-eight quarters. The council of the department over which the prefect presides [DEPARTMENT] forms a municipal council for Paris. The municipal police has charge of the safety of the public, and the sanatory regulations of the city are confided to it. It is under the direction of a prefect of police, whose office is in the island of La Cité. The police force consists of the town-serjeants and a municipal guard of horse and foot. The national guard of Paris amounts to 80,000 men, with 24 cannon. The regulations for protection against fire and for the extinguishing of fires are excellent. There is an organised body of firemen (*sapeurs-pompiers*), who are distributed in their barracks or stations. There are two large forcing-pumps called *pompes à feu* (fire-pumps), with immense reservoirs, in the western part of the city, on the opposite banks of the Seine. They supply water to many of the fountains, and are worked by steam. The supply of water is generally by public fountains, and not commonly, as with us, by pipes furnishing a supply to every house.

Before the Revolution of 1789, Paris possessed one hundred and sixty places of public worship of the Catholic church, viz. fifty parish churches, ten others with the same rights as parish churches, twenty collegiate churches, and eighty chapels-of-ease; besides three abbeys, and fifty-three other monastic establishments for men, and eight abbeys and forty-six other establishments for women. According to the last edition of Malte Brun (Paris, 1832), there were forty-one Catholic places of worship, namely two basilicæ, or principal churches, twelve churches, and twenty-seven chapels-of-ease. There were very few ecclesiastical communities for men (only four), but several for women; four or five seminaries for the priesthood, two Reformed churches and one Lutheran church, one Greek church, and one Jewish synagogue. Some other places of worship have since been added.

We have no data respecting the institutions for primary or elementary instruction applicable to the present time. Of colleges or public schools of a higher grade there are seven, namely, those of Louis le Grand, of Henri IV., of St. Louis, of Bourbon, of Charlemagne, of Ste. Barbe, and of Stanislas. Of educational establishments of the highest class, or for special or professional instruction, the most important is the Académie Universitaire, or university, with from 7000 to 8000 students. The Collège Royal de France, which may be regarded as equivalent to a university though without the name, has nearly 1000 students; and the lectures on natural philosophy at the Jardin des Plantes are attended by 3000 persons. The Royal Conservatory of Arts and Trades is attended by about 1000 pupils. To these may be added the Polytechnic School, the schools of medicine, of astronomy (at the Observatory), of engineering, of mining, of music and lyric and dramatic elocution, of the fine arts; and a number of others, especially the normal school for the instruction of teachers. The Museum of Natural History, and the Menagerie and Botanic Garden (usually known as the Jardin des Plantes) connected with it, are rich and valuable collections.

There are seventeen important libraries, six of them public, namely, the King's Library, with above 500,000 volumes, 80,000 MSS., 1,600,000 engravings, and 100,000 medals and coins; the Library of the Arsenal, with 180,000 volumes and 5000 MSS.; the Library of Ste. Géneviève, with 112,[illegible] volumes and 2000 MSS.; the Mazarin Library (at the Palais des Beaux Arts); the City Library; and that of the Museum of Natural History at the Jardin des Plantes. Of the libraries not open to the public, the principal is that of the Institute, with 70,000 volumes. The Palace of the Louvre is devoted to collections of paintings, statues, and other objects connected with the fine arts.

There are numerous learned societies, at the head of which is the Institute (*Institut National*), which for a long time comprehended four departments (or, as they are termed, *académies*), the *Académie Française*, the *Académie des Sciences*, *des Inscriptions et Belles-Lettres*, and *des Beaux Arts*. A fifth *Académie*, that of the moral and political sciences, has been added by Louis Philippe, the present king. [INSTITUT NATIONAL.]

The charitable institutions are numerous. There are seventeen hospitals, five of them for the military. The most important of the non-military hospitals is the Hôtel Dieu, in the island of La Cité; of the military hospitals, the Hôtel des Invalides. There are also thirteen hospices, or asylums. Each arrondissement has its *Bureau de Charité*, for relieving the destitute at their own habitations; these bureaux distribute annually about 1,000,000 francs, or 40,000*l*., and relieve from 60,000 to 70,000 persons. There are a variety of other institutions for affording relief or giving employment to the destitute, and vast sums are distributed every year through the medium of the clergy. Nearly two hundred benefit societies exist among the working classes.

Paris contains numerous places of amusement. There are several theatres within the circuit of the town wall, and others beyond the barriers: the most remarkable for their architectural beauty are L'Opéra Comique, Le Grand Opéra, L'Odéon, and Le Théâtre Favart. Public balls are common, and are frequented both in summer and winter; and the public gardens, especially the gardens of the Tuileries and of the Palais Royal, and the Boulevards are much frequented. Gaming houses were numerous and much frequented: it has been estimated that 11,000,000 francs, or about 440,000*l*., were annually risked in these places. The establishments were licensed by the government, and paid a heavy annual sum for their exclusive privilege. But since the beginning of 1838 the system of licensing has been discontinued. [GAMING.] Carriages of every kind, public and private, are numerous at Paris. Nearly one-third of the children born in Paris are illegitimate. The number of persons imprisoned in the department of Seine may on a yearly average be estimated at 20,500.

(Dulaure, *Histoire Physique, Civile, et Morale de Paris*, 10 tom. 8vo., Paris, 1829; Malte Brun, *Précis de Géographie Universelle*, 3rd ed., Paris, 1832, *seq.*; Balbi, *Abrégé de Géographie*, Paris, 1833; *Dictionnaire Géographique Universel*, Paris, 1831; 'Paris and its Historical Scenes,' in the *Library of Entertaining Knowledge*.)

PARIS, BASIN OF. [SEINE, Department.]

PARIS, ABBÉ. [JANSENISTS.]

PARIS, MATTHEW, was born about the end of the twelfth century, took the religious habit in the Benedictine monastery of St. Alban's in 1217, and died there in 1259. Almost the only incident of his life that has been recorded is a journey he made to Norway, by command of the pope, to introduce some reforms into the monastic establishments of that country, which mission he has the credit of having executed with great ability and success. He is said to have stood high in the favour of Henry III., and to have obtained various privileges for the university of Oxford through his influence with that king. His acquirements embraced all the learning and science of his age; besides theology and history, oratory, poetry, painting, architecture, and a practical knowledge of mechanics are reckoned among his accomplishments by his biographers or panegyrists. His memory is now preserved by his history of England, entitled 'Historia Major,' which begins with the Norman Conquest, and comes down to the year of the author's death. Of this work the following are the printed editions: 1. Fol., Lon., 1571, edited by Archbishop Parker; 2. Fol., Tiguri (Zürich), 1606, a mere reprint of the preceding; 3. Fol., Lon., 1640 (or, in some copies, 1641), edited by Dr. William Watts; 4. Fol., Paris, 1644; and 5. Fol., Lon., 1684. Watts's edition, which is sometimes divided into two volumes, besides various readings and copious indexes, contains two other works of the author never before printed, namely, his 'Duorum Offarum Merciorum Regum (S. Albani Fundatorum) Vitae,' and his 'Viginti Trium Abbatum S. Albani Vitae,' together with what he calls his 'Additamenta' to those treatises; and these minor productions are also given in the subsequent Paris and London editions. In the library of Corpus Christi College, Cambridge, there is an epitome, by Matthew Paris himself, of his History, generally referred to by the name of the 'Historia Minor,' or the 'Chronica,' which has never been published, but which, Bishop Nicolson says, contains 'several particulars of note omitted in the larger History;' and some other works, which are now lost, are attributed to him on the doubtful authority of Bale and Pits. Some old notices of his History speak of it as beginning at the creation of the world; and on this account it has been conjectured, though with no probability, that the historical compilation ascribed to the fictitious personage Matthew of Westminster, may really have been the composition of Matthew Paris. But even of the History which bears his name, the portion extending to the year 1235 is very little more than a transcript from the work of Roger de Wendover, Windleshore, or Windsor, who is said to have also been a monk of the monastery of St. Alban's. Mathew Paris writes with considerable spirit and rhetorical display; and his work, which is continued to the death of Henry III. (A.D. 1272) by William Rishanger, another monk of the same abbey, has been the *chief* authority commonly relied upon for the history of that reign. Its spirit however is somewhat fiercely and narrowly English; and from the freedom with which he inveighs against what he regards as the usurpations of the papal see, Romanist writers have always expressed strong dissatisfaction especially with his accounts of ecclesiastical affairs. Cardinal Baronius, while admitting his merits in other respects, characterises him as animated by a most determined hostility to the apostolic see ('animo infensissimo in apostolicam sedem'). Dr. Lingard goes much farther: 'It may appear invidious,' he says, 'to speak harshly of this favourite historian; but this I may say, that when I could confront his pages with authentic records or contemporary writers, I have in most instances found the discrepancy between them so great as to give to his narrative the appearance of a romance rather than a history.' It is admitted however in the sentence which immediately precedes, that this history or romance 'contains many original and some valuable documents;' 'but the writer,' it is added, 'accustomed to lash the great, whether clergy or laity, seems to have collected and preserved every malicious and scandalous anecdote that could gratify his censorious disposition.' With Protestant critics, on the other hand, Matthew Paris has been a favourite, in proportion to the dislike he has incurred from their opponents. Nicolson says, 'The whole book manifests a great deal of candour and exactness in its author, who furnishes us with so particular a relation of the brave repulses given by many of our princes to the usurping power of the Roman see, that it is a wonder how such an heretical history came to survive thus long.' At one time, it seems, it used to be affirmed by the Roman Catholics that the printed Matthew Paris was in many things a mere modern fabrication of the Reformers; but Watts, by collating all the manuscript copies he could find, and noting the various readings, proved that there was no foundation for this charge.

PARIS, also called **ALEXANDER,** one of the most celebrated characters of the mythic age, is said to have been the son of Priam and Hecuba. In consequence of an alarming dream which his mother had previous to his birth, Priam gave him to a slave to be exposed upon Mount Ida. The order was obeyed, but upon returning at the end of five days to the spot where he had exposed the infant, he found that he had been nursed by a bear. The slave took the child to his own home and brought him up as one of his sons, among the shepherds of Mount Ida. When Paris grew up, he became distinguished by his beauty and strength, and in consequence of his success in repelling the attacks of wild beasts and robbers, he is said to have obtained the name of Alexander (from ἀλέξειν). He was afterwards recognised by his parents, and received at the court of his father; but before he left his flocks he is said to have given that celebrated decision in favour of the superior beauty of Aphrodite (Venus), in consequence of which he obtained Helena, but at the same time brought upon himself and the whole Trojan race the implacable enmity of Here (Juno) and Athena (Minerva).

He is said to have carried off Helena from the court of Menelaus, while the latter was absent at Crete; and after touching at Sidon in his way home, to have brought her in safety to Troy. Herodotus however informs us (ii. 112-116), on the authority of the Egyptian priests, that Paris in his voyage home was driven to Egypt by unfavourable winds, and that Helen and all her property were detained by Proteus with the view of restoring them to Menelaus. Herodotus thinks that Homer was acquainted with this story, and quotes some passages in the Iliad and Odyssey in confirmation of his opinion.

We read very little in the Iliad of the exploits of Paris. In the third book he engages in single combat with Menelaus, and is only saved from death by the intervention of Aphrodite. He wounds with his arrows Diomed (xi. 369-383) and Machaon (xi. 505); and is mentioned in the twelfth book (l. 93) as a commander of one of the divisions of the Trojan army. According to later poets, he killed Achilles with one of his arrows. The manner of his death is variously told; but it is generally agreed that he was killed by Philoctetes with one of the arrows of Hercules. Later writers state that while he fed his flocks upon Mount Ida, he was married to Œnone, daughter of the river Cebren, who endeavoured to dissuade him from attempting to carry off Helen, but, unable to succeed in his endeavours, she told him to return to her if he was ever wounded, as she alone could save him. After being wounded by Philoctetes, Paris accordingly desired to be carried to Œnone; but offended by his desertion, she refused to heal him, and left him to his fate.

PARISH. This word is probably derived into the English language from the French *paroisse*, and the Latin *parochia* or *paroecia*, and ultimately from the Greek *paroikia* (παροικία). At the present day it denotes a circumscribed territory, varying in extent and population, but annexed to a single church, whose incumbent or minister is entitled by law to the tithes and spiritual offerings within the territory. In the early ages of Christianity the term appears to have been used in some parts of Europe to signify the district or diocese of a bishop, as distinguished from the 'provincia' of the archbishop or metropolitan. (Du Cange, *Gloss.*, ad verb. 'Parochia;' Selden's *History of Tithes*, chap. vi., sect. 3.) These large ecclesiastical provinces were gradually broken down into subdivisions, for which ministers were appointed, either permanently or occasionally, who were under the rule of the bishop, were paid out of the common treasury of the bishopric, and had no particular interest in the oblations or profits of the church to which their ministry applied. This was the state of things in the primitive times, which probably continued till towards the end of the third century. After that period proprietors of lands began, with the licence of the higher ecclesiastical authorities, to build and endow churches in their own possessions; and in such cases the chaplain or priest was not paid by the bishop, but was permitted to receive for his maintenance and to the particular use of his own church the profits or the proportion of the profits of the lands with which the founder had endowed it, as well as the offerings of such as repaired thither for divine service. This appears to be a probable account of the origin and gradual formation of parochial divisions in almost all countries where Christianity prevailed; and Selden has satisfactorily shown that the history of parishes in England has followed the same course. Soon after the first introduction of Christianity into this country, the heathen temples and other buildings were converted into churches or places of assembly, to which the inhabitants of the surrounding district came to receive religious instruction from the minister, and to exercise the rites of Christian worship. As the members of the new religion increased, a single or occasional minister was insufficient for the purpose; and a bishop, with subordinate priests, began to reside in the immediate neighbourhood of the religious houses, having the charge of districts of various extent, comprehending several towns and villages, and assigned principally with a view to the convenience of the inhabitants in assembling together at the church. Within these districts, or *circuits*, as they were called, which were precisely analogous to the diocesan *parishes* in other parts of Europe, the ministering priests itinerated for the purpose of exercising their *shriving*, but they always resided with the bishop. By degrees other churches were built to meet the demands for public worship, but still at first wholly depending upon the mother-church, and supplied by the bishop from his family of clergy resident at the bishopric with ministers or curates, who were supported by the common stock of the diocese. For the fund or endowment in each of these districts was common; and whatsoever was received from tithes or the offerings of devotees at the different altars, or by any other means given for religious uses, was made into a general treasure or stock for the ecclesiastical purposes of the whole diocese; and was applied by the bishop in the first place to the maintenance of himself and the college of priests resident with him at the church, and afterwards for distribution in alms among the poor and for the reparation of churches.

This community of residence and interest between the bishop and his attending clergy, who are often termed in the chronicles of those days *episcopi clerus*, constituted the notion of cathedral churches and monasteries in their simplest form. How long this state of things continued does not precisely appear, though Selden expresses an opinion that it was in existence as late as the eighth century. (*History of Tithes*, chap. ix., sect. 2.) It has indeed been asserted by Camden (*Britannia*, p. 160), and was formerly the commonly received opinion, that Honorius, the first archbishop of Canterbury after Augustin, divided his province into parishes about the year 630; but Selden proves satisfactorily that Honorius could not have made a parochial division in the sense in which we now understand the term; and that, if made at all, it must have been such a distribution into districts, then called parishes, as is above described, and which was so far from originating with Honorius, that it must have been nearly as antient as bishoprics.

It seems most probable that the creation of parishes in England was not a simultaneous act, but was the gradual result of circumstances, and was not fully effected till near the time of the Conquest. (Hallam's *Middle Ages*, vol. ii., p. 205.) As Christianity became the universal religion, and as population increased, the means of divine worship supplied by the bishoprics and monasteries became inadequate to the wants of society, and lords of manors began to build upon their own demesnes churches and oratories for the religious purposes of their families and tenants. Each founder assigned a definite district, within which the functions of the minister officiating at his church were to be exercised, and expressly limited the burthen as well as the advantages of his ministry to the inhabitants of that district. As these acts of piety tended to the advance of religion, and were in aid of the common treasury of the diocese, they were encouraged by the bishops, who readily consecrated the places of worship so established, and consented that the minister or incumbent should be resident at his church, and receive for his maintenance, and for the use of that particular church, the tithes and offerings of the inhabitants, as well as any endowment or salary which the founder annexed to it. This endowment or salary usually consisted of a glebe, or a portion of land appropriated to that purpose, which was indeed the only means of providing for the maintenance of the incumbent at a time when almost all the wants of life were supplied from the immediate produce of the earth, and, together with the right of receiving the other ecclesiastical profits which arose within the territory limited by the founder, became the settled revenue of the church, and annexed to it in perpetuity. The last concession made to the lay-founder was probably the patronage or right of presenting the clerk to the church, which, by the primitive constitution, belonged exclusively to the bishop; and when this was obtained, these limited territorities differed in no material respect from our modern parishes. Indeed it can scarcely admit of doubt that our parochial divisions arose chiefly from these lay-foundations, the differences in extent being accounted for by the varying limits appointed for them at their origin. Their names were derived from some favourite saint, from the site, or the lordship to which they belonged, or from the mere fancy of the respective founders. Such appears to have been the origin of the lay parishes; and it is reasonable to conclude that as soon as this practice was established, the bishops and religious houses, in the districts or parishes in which they had reserved to themselves the right of presentation, followed the same course by limiting the ecclesiastical profits of each church to the particular incumbent, and restricting the devotions as well as the offerings of the inhabitants to that church only.

The earliest notice of these lay foundations of parishes is by Bede, about the year 700 (*Hist. Eccl.*, lib. v., c. 4 and 5.) By the end of the eighth century they had become frequent, as clearly appears from the charters of confirmation made to Croyland Abbey, by Bertulph, king of Mercia, in which several churches of lay-foundation are comprehended. In the laws of king Edgar (A.D. 970) there is an express provision that every man shall pay his tithes to the [illegible] antient church or monastery where he hears God's service: [illegible] 'Which I understand not otherwise,' says Selden, 'than [illegible] church or monastery whither usually, in respect of his monastery or his parish, he repaired; that is, his parish church or monastery.' (*History of Tithes*, chap. ix., § 4.)

Although the origin of parishes generally in England is pretty clearly ascertained, the history of the formation of particular parishes is almost wholly unknown. As these divisions originated in an unlettered period, and were too local and obscure to be recorded in the chronicles or general histories of the times, and for the most part too antient to be preserved in any episcopal registers now existing, it would be unreasonable to expect any satisfactory evidence of their particular origin; and as a matter of fact, no evidence whatever can be produced on the subject.

However satisfactory this account of the origin of parishes may be with reference to country parishes, it furnishes no explanation of the origin of parishes in towns—a subject which is involved in great obscurity; and indeed the changes which the latter may be shown to have undergone within time of memory seem to point to a different principle of formation.

The country parishes appear to be nearly the same in name and number at the present time as they were at the time of Pope Nicholas's 'Taxation,' compiled in the reign of Edward I. (A.D. 1288); but in some of the large towns the number of parishes has very considerably decreased. Thus, in the city of London there are at present 108 parishes, though at the time of the 'Taxation' the number was 140; in like manner in Norwich the number has been reduced from 70 in the time of Edward I., to 37 at the present day. In other antient towns, such as Bristol, York, and Exeter, the number does not appear to have materially changed, but the names have been often altered. The particular causes of these variations it would be difficult to trace; but greater changes might reasonably be expected in towns than in the country parishes, in consequence of more frequent fluctuations of wealth and population in the former. Where a decrease has taken place in the number of town parishes in the three last centuries, it is probably to be accounted for by the great reduction since the Reformation in the amount of oblations and what are called *personal* tithes, which in cities were almost the only provision for the parochial clergy.

The size of English parishes varies much in different districts. In the northern counties they are extremely large, forty square miles being no unusual area for a parish; and, generally speaking, parishes in the north are said to average seven or eight times the area of the southern counties. (See Rickman's *Preface to Population Returns of* 1831.) The boundaries of parishes in former times appear to have been often ill-defined and uncertain; but since the establishment of a compulsory provision for the poor by means of assessments of the inhabitants of parishes, the limits have in general been ascertained with sufficient precision.

It is not easy to ascertain the exact number of parishes in England and Wales; for although they have been enumerated on several occasions, the number ascertained has usually depended upon the object and purpose of the particular enumeration. Thus in the returns under the Poor-Law Commission, a parish is generally considered as a place or district supporting its own poor, and from these returns it appears that the total number of such places is 15,400. But in this number are included many subdivisions of parishes, such the townships in the northern counties, which by stat. 13 and 14 Car. II., c. 12, § 21, are permitted to maintain their own poor, and also other places which by act of parliament, though not parishes, have the same privilege. Another difficulty, which has probably affected all the enumerations which have hitherto been made, is the large number of doubtful parishes. It is somewhat uncertain at the present day what circumstances constitute a parish church. In the Saxon times, and for some centuries after the Conquest, the characteristics which distinguished a parish church from what were called field-churches, oratories, and chapels, were the rights of baptism and sepulture. (Selden, *History of Tithes*, chap. ix., 4; Degge's *Parsons' Counsellor*, part i., chap. xii.) But in modern times this line of distinction would include as parish churches almost all chapels-of-ease, and also the churches and parochial chapels erected under the stat. 58 Geo. III., c. 45, 'for building additional churches in populous places.' The various views entertained of the constituents of a parish will in a great measure account for the different results of the several enumerations which have been made; and this is in fact one of the reasons assigned by Camden for the difference between the number of the parish-churches in England and Wales stated to Henry VIII. in 1520, by Cardinal Wolsey, and that stated about a century after in James I., the former being 9407, and the latter 9284. (Camden's *Britannia*, 161-2.) The sum total of the parishes mentioned in Pope Nicholas's 'Taxation' above referred to, as nearly as can be ascertained, appears to be between these two accounts. Blackstone says that the number of parishes in England and Wales had been computed at 10,000, but gives rather a questionable authority for his statement. (*Commentaries*, vol. i., p. 111.) In the Preface to the 'Population Returns' of 1831, above referred to, the number of parishes and parochial chapelries in England and Wales is said to be 10,700, and in Scotland 949; but in the next page, where a summary of the number of parishes in the different dioceses is given, the total is stated as 11,077. Perhaps the number of parishes in England and Wales (meaning by the term simply a district annexed to a church whose incumbent is by law entitled to the perception of tithes in that district) may be taken to be about 11,000.

(See Holland's 'Observations on the Origin of Parishes,' in Hearne's *Discourses*, vol. i., p. 194; and Whitaker's *History of Whalley*, book ii., chap. 1.)

PARK. This term, in its legal signification as a privileged enclosure for beasts of the forest and chase, is at the present day nearly obsolete. Under the antient forest-laws, the franchise of the highest degree was that of a forest, which was *nomen generalissimum*, and contained within it the franchises of chase, park, and warren. The only distinction between a chase and a park was, that the latter was enclosed, whereas a chase was always open, and they both differed from a forest, inasmuch as they had no peculiar courts or judicial officers, nor any particular laws, being subject to the general laws of the forest; or, as Sir Edward Coke maintains, to the common law exclusively of the forest-laws. (4 *Inst.*, 314.) A chase and a park differed from a forest also in the nature of the wild animals to the protection of which each was applied. The beasts of the forest, or beasts of venery, as they were called, were *bestiæ silvestres*, that is, as Manwood explains the phrase (*Forest Laws*, chap. iv., sec. 4), animals such as the hart, hind, hare, boar, and wolf, which 'do keep the coverts and haunt the woods more than the plains.' On the other hand, the beasts of chase or park were *bestiæ campestres*, that is to say, they haunted the plains more than the woods. According to the strict legal meaning of the term, no subject can set up a park without the king's grant, or immemorial prescription, which is presumptive evidence of such a grant. In modern times the term is little known, except in its popular acceptation as an ornamental enclosure for the real or ostensible purpose of keeping fallow deer, interspersed with wood and pasture for their protection and support. (Blackstone's *Commentaries*, vol. ii., p. 38.)

PARK, MUNGO, was born on the 10th of September, 1771, at Fowlshiels, a farm on the banks of the Yarrow, not far from the town of Selkirk. His father, an intelligent and successful farmer, died in the year 1792, but not until Mungo had been fairly launched into professional employment; his mother, who was alive in 1816, was the daughter of a farmer in the vicinity of Fowlshiels. Mungo was the seventh child and third son of a family of thirteen, eight of whom attained the years of maturity.

At the usual age, Mungo was sent to the parochial school at Selkirk. 'He had,' says the writer of the biography prefixed to the complete edition of his Travels, 'shown a great love of reading from childhood, and was indefatigable in his application at school, where he was much distinguished and always at the head of his class. Even at that early age, he was remarked for being silent, studious, and thoughtful; but some sparks of latent ambition occasionally broke forth, and traces might be discovered of that ardent and adventurous turn of mind which distinguished him in after-life.' At the age of fifteen, Mungo Park was apprenticed to Mr. Thomas Anderson, a respectable surgeon in the town of Selkirk, with whom he resided three years, during which time he improved his acquaintance with the classics by occasional attendance at the grammar-school.

In 1789 Park removed to the university of Edinburgh, where he attended, during three successive sessions, the course of lectures prescribed to all who wish to graduate as surgeons. There is nothing left on record of his academical life, except that he devoted considerable attention to botany. Any spontaneous inclination he might feel towards botanical pursuits must have been confirmed and encouraged by associating with his brother-in-law Mr. James Dickson, who, having settled in London as a nurseryman and seedsman, and having attracted the notice of Sir Joseph Banks, had acquired considerable reputation as a scientific botanist. A tour which Park made through the Highlands with this gentleman during one of the summers of his college life contributed much to his progress in the science of botany.

On the completion of his studies at Edinburgh, Park repaired to London. Mr. Dickson introduced him to Sir J. Banks, through whose interest he obtained the appointment of assistant-surgeon to the Worcester, East Indiaman. He sailed in that vessel in the month of February, 1792, on a voyage to Sumatra, and returned to England in the course of the following year. He availed himself of the opportunities afforded him by this voyage to extend his acquaintance with natural history. The third volume of the 'Linnæan Transactions' contains a paper read by Park on the 4th of November, 1794, containing descriptions of eight fishes, not previously described, from the waters of Sumatra, which he represents as the fruits of his leisure hours during his stay on that coast.

At the time of Park's return, the exertions of the African Association had concentrated a strong interest upon that quarter of the globe. Under the guidance of Major Rennell, the Association had collected and published, in a systematic form, a considerable amount of information relative to the interior of Africa. The problem which at that moment more especially engaged their attention was the existence and course of the river mentioned by some antient geographers by the name of Niger. Intelligence had been recently received of the death of Major Houghton, who had been sent out by the Association for the purpose of exploring the course of the Niger, and much difficulty was experienced in finding a successor. Park's attention was naturally attracted to the subject through his connection with Sir Joseph Banks, one of the most active and influential members of the Association. A liberal reward had been offered to any person willing to proceed on the arduous mission who should be found qualified for it. Park had a general passion for travelling; he was in the full vigour of youth; he had some experience of a hot climate; he was not insensible to the distinction to be acquired by a discoverer in African geography: he offered his services to the Association; and, after inquiry into his qualifications, the offer was accepted. Two years elapsed however between his return from India and his departure on his African expedition. With the exception of the time occupied by a short visit to Scotland in 1794, he seems to have resided during the whole of this period in London or the neighbourhood, chiefly occupied in acquiring the knowledge and making the preparations necessary for his undertaking.

He sailed from England on the 22nd of May, 1795, and reached Pisania, a British factory about 200 miles up the Gambia, on the 5th of July. Here he remained several months in the house of Dr. Laidley, learning the Mandingo language, and collecting information concerning the countries he was to visit. For two of these months he was confined by a fever contracted by imprudent exposure during the rainy season.

He left Pisania on the 2nd of December, 1795. After passing through the territories of a number of petty negro chiefs, he was induced, in order to avoid the suspicion of being a spy, which might have attached to him had he passed from the territories of the chief of Kaarta into those of the chief of Bambara, those sovereigns being then at war, to adopt a more northerly route across the territory of Ludamar, then governed by the chief of a predatory horde of nomade Moors. He reached Yarra, the frontier town of this state, on the 18th of February, 1796. Ali, the Moorish chief, detained him a captive till the 1st of July. When Park made his escape he possessed nothing more than a horse with its accoutrements, a few articles of clothing, and a pocket-compass, which he had saved from the Moors by concealing it in the sand. Undismayed by his destitute and lonely condition, he pushed on to the Nil el Abid, or Joliba, which he reached at Sego, after a journey of fifteen days; explored the stream downwards to Silla and upwards to Bammakoe, then crossed a mountainous country to Kamalia, a Mandingo town, which he reached on the 14th of September. Here, 500 miles from the nearest European settlement, his health gave way, undermined by the fever which had attacked him at Pisania, assailed by the vexations and sufferings to which he had been exposed, first as a captive and afterwards as a fugitive, dependent for support upon precarious charity, and exposed to the vicissitudes of the weather. For upwards of a month he was rendered helpless by a fever, among a race which, though alive to human sympathy, could neither think nor feel as he thought and felt. He was detained in the same place five months after his recovery, before he could obtain the means of journeying to the coast. At last, on the 10th of June, 1797, he returned to Pisania, and was received by Dr. Laidley 'as one risen from the dead.' His lonely and toilsome wanderings had occupied upwards of nineteen months.

His unexpected return, the rumours which went abroad regarding his adventures and the strange countries he had visited, excited eager curiosity in the public mind. An abstract of the expedition, prepared by Mr. Bryan Edwards, secretary to the African Association, from materials furnished by the traveller himself, was printed and distributed among the members. To this abstract a memoir by Major Rennell was annexed, consisting of geographical illustrations of Park's journey. It was at the same time announced that a complete narrative would be prepared and published by Park himself. The composition of this work occupied him till the spring of 1799, when it was published. His principal place of residence while engaged upon it was London; and while there he was in constant communication with Major Rennell and Mr. Bryan Edwards, especially the latter. The summer and autumn of 1798 he spent among his relations in Scotland; his head-quarters being Fowlsheils, at that time occupied by his mother and one of his brothers. The accounts subsequently collected from his family represent him as leading then the life of a hard student employed on his papers during the whole of the morning, and allowing himself scarcely any recreation beyond a solitary walk on the banks of the Yarrow. He adopted the abstract of Bryan Edwards as the framework of his book; and Major Rennell's Memoir was added as an appendix. The work was well received; two impressions were rapidly sold off. The profits of publication and the liberal remuneration he received from the Association placed him for the moment in easy circumstances.

In 1799 he retired to his native country, and in the August of that year married the daughter of Mr. Anderson, with whom he had served his apprenticeship. He continued to reside for upwards of two years subsequent to his marriage in the house of his mother, unable or unwilling to settle to any steady employment. At last a favourable opportunity for commencing the practice of his profession occurring in Peebles, he settled with his family in that town, in October, 1801. The practice of a country surgeon in Scotland is attended with much toil and even danger, and the remuneration is very inadequate. Park soon obtained a good share of the business of the neighbourhood, but his profits were inconsiderable. In other respects his situation was agreeable. He was a man of retired habits, who sought and found his happiness in the family circle. There were however in the neighbourhood some minds who could appreciate the intellectual and moral worth that lay beneath his cold exterior. Among these were Dr. Adam Ferguson, at one time professor of moral philosophy in the university of Edinburgh, and author of the 'History of Rome,' and Mr (afterwards Sir Walter) Scott. He also received marked personal attentions from Mr. Dugald Stewart. But the gratification of being appreciated by such men and enjoying their society was no sufficient counterpoise to the harassing reflection that his income was inadequate and his family increasing. His mind too had never ceased to dwell upon foreign adventure. An overture made to him on the part of government, in 1798, to take a part in a survey of New Holland then in contemplation, had been renewed in 1799, but without any other result than that of keeping Park's mind unsettled. In 1801, the prospect of an appointment on the surgical staff at Goree, which had been recently captured from the French, seems to have crossed his mind. In 1[illegible] he learned, by a letter from Sir Joseph Banks, that the Association would probably, in the event of peace, renew their efforts in African discovery, and that Park would certainly be recommended as the most eligible person to be employed. In the autumn of 1803, he received a letter from the office of the colonial secretary of state, requesting his immediate attendance in London. The result of his interview with Lord Hobart was his acceptance of the proposal from government that he should command an expedition of discovery into the interior of Africa, and that the expedition should leave England in the end of February. Some changes in the cabinet caused a postponement. Doubts that began to be entertained of the practicability of the attempt occasioned a further delay. It was not till the 30th of January, 1805, that Park actually sailed from Portsmouth. The interval he had employed, at the suggestion and expense of government, in obtaining a knowledge of the Arabic language, and improving himself in the practice of making astronomical observations.

Park had adopted Mr. Maxwell's opinion, that the Congo and the Niger were one stream; and his plan was, with a supply of merchandise sufficient to defray travelling expenses, and a body of soldiers sufficient to ensure immunity from hostile attacks, to cross from the Gambia to the Niger, and then sail down the stream to the ocean. The expedition, as it started from Pisania, consisted of himself, his brother-in-law Mr. Anderson, surgeon, and Mr. George Scott, draughtsman to the expedition, five artificers from the royal dockyards, Lieutenant Martyn and 35 privates of the Royal African corps stationed at Goree, and Isaaco, a Mandingo, a priest and trader, the guide. Supplies of asses had been purchased at St. Jago and Goree to carry the merchandise. The expedition left Pisania on the 4th of May, 1805.

Park's journal, completed up to the time of his departure from Sansanding, and some letters which he despatched along with it, bring the narrative of his adventures down to that period. To Mrs. Park he wrote, on the 19th of November:—'We have already embarked all our things, and shall sail the moment I have finished this letter.' In his letter to Lord Camden (Lord Hobart's successor in the colonial office), he said:—'I am sorry to say that of forty-four Europeans who left the Gambia in perfect health, five only at present are alive, viz. three soldiers (one deranged in his mind), Lieutenant Martyn, and myself.' He added:—'We had no contest whatever with the natives, nor was any one of us killed by wild animals or any other accidents;' and, again:—'Your lordship will recollect that I always spoke of the rainy season with horror, as being extremely fatal to Europeans, and our journey will furnish a melancholy proof of it.' Isaaco stated on his return to the Gambia that Mr. Park arrived at Foulah Dougou with thirty-three white men; and from Foulah Dougou to Sego (which was eight days' march, but which is generally performed in three days by a negro), they lost twenty-one men by the rains, damps, &c.

At Sansanding, Park dismissed Isaaco, and took, upon his recommendation, a man named Amadi Fatouma to guide him to Haoussa. From this man was procured the only direct contemporary evidence regarding the fate of Park and his companions that has been obtained. His accuracy however is established by a strong body of circumstantial evidence: the traditions of the fate of some white men, collected by Clapperton and Lander, on the spot where Fatouma stated that Park and his companions had perished; muskets with the Tower stamp, seen by Lander at Wowow, and said to have been the property of the white men who perished at Boussa; a book of tables seen by Lander at Boussa, among the leaves of which was found a card of invitation to dinner, addressed to Mr. Park by a Mr. Watson, and dated 'Strand, 9th November, 1804.' The story of Amadi Fatouma, corroborated in its essentials by these circumstances, is briefly this:—that in sailing down the Niger they had repeated encounters with the natives; that on arriving at Yaouri, Fatouma's engagement having terminated, he quitted Mr. Park; that after Mr. Park's departure, the chief of Yaouri informed the king (falsely) that the white men had departed without giving the customary present; that the king in rage imprisoned Fatouma, and sent an armed force to intercept the white men at the narrows of the river; that on his release from prison Fatouma learned from a slave (the only survivor of Park's party) that during a skirmish which ensued the boat was jerked into a rapid, and that the white men, in attempting to make their escape, were drowned.

Thus perished Mungo Park, towards the close of 1805, in the thirty-fifth year of his age. In person he is said to have been tall and athletic. His manner was cold and reserved, approximating in part to that shyness which most persons conscious of their own powers are apt to feel in society when the circumstances of their early life have kept them from mingling with it. His last letter to Mrs. Park (in which he affects a degree of confidence and hope he could not possibly have felt, to allay her apprehensions), and many little incidents in his brief history, show the warmth and strength of his attachments. His judicious conduct while detained by the Moorish chief would alone be sufficient to establish his reputation for the control of his passions; and what he achieved in his first journey, together with the simple striking language of his last letter to Lord Camden, show the power of his determination and perseverance. His acquirements in natural history were necessarily limited; for in Scotland, where he laid their foundation, that branch of knowledge was only beginning to attract attention, and his residences in London were brief, and occupied with other matters. It was not till the eve of his departure on his second journey that he acquired the Arabic language, not only the best medium of communication with the Moors and Arabs, but the only key to the civilization of Africa, such as it is. His acquaintance with astronomy does not seem, even at the time of his second journey, to have gone beyond the power of making with accuracy the necessary observations for the ascertaining of latitudes and longitudes; and at the time of his first journey, seems to have been limited to the power of observing for the latitude with the sextant. On his first journey he lost all his instruments, with the exception of a pocket-compass, when taken prisoner by the Moors: on his second journey he was better provided; but his only chronometer seems to have been very defective. These deficiencies however in acquirements and apparatus were in a great extent counterbalanced by a calm courageous self-possession, an unwearied power of observation, and a modest scrupulous veracity that enables us to rely upon his statements as in no instance exaggerated.

Almost the whole of the country which he traversed may be regarded as having been before him unvisited by Europeans, and nothing of any moment has been added to our knowledge of it since his death. His ignorance of Arabic on his first journey exposed him to misappreciate the Arabs; but his detention in a Mandingo village enabled him to master the domestic life of the negroes and their civil and economical organization. His meteorological and botanical observations are valuable: his geological are less so. Walckenaer and his echo Bowditch have impugned the trustworthiness of his observations for latitude on his second journey, on account of an entry in his journal, '31st April,' that month having only 30 days. But Oltmanns has satisfactorily established, in an elaborate and able paper in the 'Transactions of the Berlin Royal Academy,' by comparison of the *data* stated in Park's journal with the Ephemerides of the 'Nautical Almanac' for 1805, that by whatever oversight he may have written '31st April,' he was perfectly correct in his reckoning when he made his observations. On the other hand Oltmanns has pointed out a circumstance which vitiates Park's calculations of his observations for longitude: the confusion arising out of the substitution, without sufficiently explicit warning, in 1805, in the Ephemerides of the 'Nautical Almanac,' of *mean time* for apparent time in the tables for the eclipses of Jupiter's satellites. Unluckily Park has stated only in one instance (Bee-creek) the whole of the *data* upon which his longitudes were calculated; and consequently in that one instance alone can his oversight be corrected. Only one opinion can be entertained of the sound judgment displayed by Park in his conduct during his first journey as a solitary traveller. His judgment in the estimation of obstacles and the calculation of forces by which they might be overcome in planning the expedition in which he perished, is more open to challenge: but he did not seek to shun the consequences. A question regarding the degree of credit due to him in a literary point of view for the narrative of his first travels, seems really of little consequence. It is clear that, unaccustomed to literary composition, he formed his book upon the model of Bryan Edwards's abstract; but that it was his own composition there seems no good reason to doubt. Either owing to natural good taste, or a lucky want of facility in sentence-turning, his style is far less turgid than that of his model.

Park left a widow and three children. Mrs. Park died in the month of February in the present year: it is believed that none of her children have survived her.

(*Travels in the Interior Districts of Africa, &c.*, by Mungo Park, surgeon, 2 vols. 8vo., London, 1816; *Narra-*

tive of Discoveries in Central Africa, &c., Denham and Clapperton, 1 vol. 4to., London, 1826; *Journal of a Second Expedition to Africa, &c.*, Clapperton, 1 vol. 4to., London, 1829; *Journal of an Expedition to explore the Course and Termination of the Niger*, by Richard and John Lander, 3 vols. small 8vo., London; Oltmanns, *Ueber die Nichtigkeit einiger Verbesserungen welche mit Mungo Park's letzten Breitenbestimmungen in Africa vorgenommen sind. Abhandlungen der Königlichen Academie der Wissenschaften zu Berlin aus dem Jahre* 1831.)

PARK OF ARTILLERY, an assemblage of the heavy ordnance belonging to an army, with its carriages, ammunition waggons, and stores, on ground contiguous to that which is occupied by the troops when encamped.

The park is formed in the immediate vicinity of roads by which the artillery may be readily moved to any spot where its service may be required: it is usually in rear of the troops, the guns being arranged in one line if the ground will permit; and if the army is to remain for some time in its position, the park is, for preventing the intrusion of improper persons, surrounded by chevaux-de-frise or other obstacles. At the siege of a fortress the park is situated between the army and the place, and it should be beyond the range of the artillery of the latter. If possible, it may be behind some rising ground, and on a spot from whence the artillery may be speedily brought up to the trenches or batteries.

In determining the extent of a park, 10 feet along the front are allowed for each gun; and since the limber and the ammunition waggon are placed in rear of the gun in one line, and in the direction of the depth, the latter must necessarily be sufficient for these, as well as to permit the horses to be attached to the carriages. The guns of each different calibre are commonly placed in that part of the park which is nearest to the point of ground to be occupied by them when in position; but the artillery is sometimes arranged in the park according to its calibre, the heaviest being on the right of the line. The muzzles are usually turned towards the front of the line; but if the guns are liable to be suddenly called for, the shafts of the limbers and the trails of the guns are then placed in that direction for the sake of a more speedy removal.

A quarter-guard, as it is called, is posted at a certain distance from and opposite the middle of the front of the park: the gunners' tents are arranged along the two flanks; those of the commissioned officers are in the rear; and behind them, generally, the horses are picketed in one line or more, parallel to that of the guns.

At the siege of a fortified place, the stores of gabions, fascines, and other materials used in the operations of the attack, as well as the spades, axes, and other tools for executing the trenches, raising batteries, or cutting down obstacles, are deposited in a particular place, for the purpose of keeping them in security and near at hand when wanted: this constitutes what is called the engineers' park. Like that of the artillery, it is situated where it may be concealed from the view of the enemy, and where means exist for a ready communication, at all times, both with the camp in the rear and with the trenches in front. The necessity of having the parks as far as possible from the place besieged, may be conceived from the fact that, at the siege of Badajos, in consequence of their being within range of artillery, the shot and shells from the town often fell into them; and once the cavalry of the garrison, in a sortie, actually rode through the engineers' park, on which occasion the whole store of materials collected by the besiegers might have been destroyed.

In the French service two parks were sometimes formed for the artillery; a great park for the guns, carriages, &c., and a small park to contain the working places for the carpenters and armourers, with the materials for making the repairs which are constantly required during a campaign.

PARKER, MATTHEW, born 1504, died 1575, a very eminent name in the catalogue of illustrious Englishmen. That he attained to the highest dignity in the English church is not the sole proof of his claim to be so spoken of; but that he was an eminent scholar as well as great churchman, a cultivator of historical literature as well as a great proficient in theological learning, and that he was archbishop of Canterbury in that critical period when the English Protestant or Reformed Church was in its infancy, and that he fulfilled the purposes of those who placed him in that high dignity by the skill with which he conducted the very difficult operations necessary at that time for its formation in a certain order and its perpetual existence.

Parker was a native of the city of Norwich, educated in Corpus Christi College, Cambridge, being intended for the church, and was so diligent in his studies, especially of the Scriptures and the fathers, that before he was thirty he was fixed upon by Wolsey to be one of his professors in the college which he meant to found at Oxford. This honour however Parker declined, probably in consequence of having attached himself to the reforming party in the church, with some of the more eminent of whom he was by that time become intimate. At this early period of his life he had a licence to preach.

We must pass lightly over the succession of his preferments during the reigns of Henry VIII. and Edward VI. Beside having two or three benefices, he was made an archdeacon in 1526; dean of the college of Stoke Clare, his favourite piece of preferment, 1535; one of the king's chaplains, 1537; master of Corpus Christi College, 1544; dean of Lincoln, 1552. In 1545 he was vice-chancellor of his university.

He took a wife in 1547. One of the measures of the reign of Queen Mary, by which it was hoped to re-establish the church in its former state and order, was to deprive the married clergy of all their benefices and preferments. This removed from the church at one stroke no small number of the more zealous reforming divines. It is marvellous that Parker fared no worse in the reign of Mary. It does not appear that he even found it necessary to leave England, but rather that he continued to live quietly in the eastern counties, pursuing his theological studies.

Very soon after the death of Mary, and when Elizabeth had ascended the throne, he was summoned from his retirement, and induced to accept at once the high dignity of archbishop of Canterbury. His consecration took place on December 17, 1559.

He was archbishop more than fifteen years, during which time he was assiduously employed in watching over the interests of the new-formed church, and in giving it that consistency and order which the church of England has since maintained. We cannot enter into the detail of what he did, but we must not forbear to mention that the preparation of the great work called the Bishops' Bible was performed under his auspices, and that the work was completed in 1568. Whoever wishes for more information respecting the labours of this eminent father of the English Protestant church, and the minute particulars of his history and character, may be abundantly satisfied by consulting the folio Life of him written by the indefatigable Strype.

Parker is not to be estimated solely by what he did as an ecclesiastic. He collected a large library of valuable manuscripts, which he gave to his college in Cambridge, where he founded also divers fellowships and scholarships. The manuscripts still remain, having been very carefully preserved. There is a minute and excellent catalogue of them in print by Nasmith, who made also a catalogue of the manuscripts in the Public Library at Cambridge, which has never been printed. Parker gave encouragement to Saxon literature by the publication of a Saxon homily. He caused to be printed also the Chronicles of Matthew of Westminster and Matthew Paris; and there is an original treatise, 'De Antiquitate Britannicæ Ecclesiæ,' which is usually attributed to him, and in the preparation of which he had no doubt much concern.

PARKER, SAMUEL, born 1640, died 1687, a prelate of the English church, was of Puritan extraction, and was remarked for certain Puritan extravagancies, when, as a young man, he entered Wadham College, Oxford. But at Oxford he became acquainted with several persons of a very different turn of mind, and particularly with Dr. Ralph Bathurst, who is said by the writers of his Life to have been chiefly instrumental in drawing him away from a party which was marked for persecution and extinction. He had an active pen, which he employed about the time of the Restoration, and for a few succeeding years, in repeated attacks on the Puritan, or, as it then was become, the Non-conforming party. The controversy is almost forgotten, and we think it needless to recount the titles of the tracts.

He was favoured and promoted in the church. In [illegible] he was made chaplain to Archbishop Sheldon, and in [illegible] he was a prebendary of Canterbury, and had the livings Ickham and Chartham.

When king James II. contemplated the re-union of England to the general church, with its head in the Roman pontiff, he looked among the English divines for persons who might be willing to assist in his designs, and, amongst other persons, he fixed upon Parker, who was made by him bishop of Oxford, in January, 1686; and when Hough was deprived of the presidentship of Magdalen College, it was given to Parker. It is said that he was strongly inclined to popery, but how far he would have gone with the king in that direction cannot well be fully determined, as his life was cut short soon after he had obtained this dignity. He died at Magdalen College, on May 20, 1687.

The only writing of Bishop Parker of any permanent reputation is a treatise entitled 'De Rebus sui Temporis Commentarius.' This treatise was not published till 1726, when it was given to the world by his son, a second Samuel Parker, an eminent non-juring divine.

PARKHURST, JOHN, was the second son of John Parkhurst, Esq., of Catesby in Northamptonshire. He was born in June, 1728, and educated at Rugby Grammar-school, and afterwards at Clare Hall, Cambridge, where he took the degree of B.A. in 1748, and that of M.A. in 1752. He was for some years a fellow of his college. He took orders in the church of England, but never obtained any preferment, having succeeded to a considerable estate, which rendered him independent. He acted, without receiving any salary, as curate of the church at Catesby, the preferment of which was in his own gift.

In 1754 he married Susanna Myster, daughter of John Myster, Esq., of Epsom in Surrey. She died in 1759, leaving him a daughter and two sons. In 1761 he married Millicent Northey, by whom he had a daughter, Mrs. Thomas, who became eminent for her learning: she wrote her father's epitaph in Epsom church.

Parkhurst died at Epsom, on the 21st of March, 1797. He was a man of great integrity and firmness of character. He always lived in retirement, though he possessed qualities which fitted him to shine in society. In spite of a weak constitution, he was a most laborious student, rising for many years at five o'clock in the morning.

His first work was 'A Serious and Friendly Address to the Rev. John Wesley,' remonstrating against the doctrine of the faith of assurance as held by that divine: it was published in 1753. In 1762 he published the first edition of his 'Hebrew and English Lexicon, without Points,' with a Hebrew grammar, which has passed through several editions. His 'Greek and English Lexicon to the New Testament,' with a Greek grammar, appeared in 1769. Of this work there are several editions, both in 4to. and 8vo.: the first of the octavo editions was edited by his daughter, Mrs. Thomas. A new edition, by the Rev. Hugh James Rose, D.D., was published in 1829. The only other work published by Mr. Parkhurst was 'The Divinity and Preexistence of our Lord and Saviour Jesus Christ demonstrated from Scripture, in answer to the First Section of Dr. Priestley's Introduction to the History of Early Opinions concerning Jesus Christ,' Lond., 1787, 8vo. Dr. Priestley replied to this work in 'A Letter to Dr. Horne.'

Parkhurst's lexicons have enjoyed a considerable reputation from the time of their first appearance. They are disfigured by many fanciful and ridiculous etymologies, and they bear traces of the Hutchinsonian opinions of their author. They are now superseded by the works of Gesenius, Winer, Wahl, Bretschneider, and Robinson.

(*Chalmers's Biographical Dictionary.*)

PARKIA, a genus of plants of the natural family or tribe of Mimoseæ, named by Mr. Brown, the chief of botanists, in honour of the great African traveller Mungo Park. The genus contains only a few unarmed trees, which are found on the west coast of Africa, the peninsula of India, Silhet, and in the islands to the eastward of the Bay of Bengal. Parkia is distinguished among the Mimosa-like Leguminosæ by the tubular 5-cleft calyx and the corolla with 5 distinct petals having a more or less imbricate æstivation; stamens 10, hypogynous, monadelphous. Legume many-seeded, 2-valved, with a farinaceous pulp around and between the seeds. Inflorescence an axillary peduncled and club-shaped spike.

P. Africana is the *Nitta* or *Doura* tree of Soudan. The farinaceous matter surrounding the seeds is eaten, and also made into a pleasant drink when steeped in water. The seeds are roasted as coffee is with us, then bruised and allowed to ferment in water. When they begin to become putrid, they are well washed and pounded, and the powder is made into cakes resembling chocolate, which form an excellent sauce for all kinds of meat. (Brown, in Denham.) A species of this genus, the Mimosa pedunculata of Roxburgh, is said by him to be similarly valued by the Malays, that is, they eat the mealy matter which surrounds the seeds, as well as the seeds themselves, which are said to taste like garlic.

PARKINSO'NIA ACULEATA, or the Barbadoes Flower-Fence, is a well known West Indian shrub, very generally employed in such climates as an ornamental plant, and especially for the construction of hedges, for which its strong spines render it well adapted. It has long pinnated leaves, with a winged petiole, and grows as much as twelve or fifteen feet high. The flowers are large, yellow, very numerous, and a little variegated with red spots, and are succeeded by long narrow knotted pods. When in flower it is said to be one of the most splendid objects in the vegetable kingdom. It has long been cultivated in this country, but it seldom flowers, probably from not having room enough given it to grow in. The seeds are said to possess febrifugal qualities.

PARLIAMENT, IMPERIAL, the legislature of the United Kingdom of Great Britain and Ireland, consisting of the king or queen [KING], the lords spiritual and temporal [LORDS, HOUSE OF], and the knights, citizens, and burgesses [COMMONS, HOUSE OF] in parliament assembled.

The word is generally considered to be derived from the French, 'parler,' to speak. 'It was first applied,' says Blackstone, 'to general assemblies of the states under Louis VII. in France about the middle of the twelfth century.' The earliest mention of it in the statutes is in the preamble to the statute of Westminster, A.D. 1272.

Origin and Antiquity of Parliament.

The origin of any antient institution must be difficult to trace, when in the course of time it has undergone great changes; and few subjects have afforded to antiquaries more cause for learned research and ingenious conjecture than the growth of our parliament into the form which it had assumed when authentic records of its existence and constitution are to be found. Great councils of the nation existed in England both under the Saxons and Normans, and appear to have been common amongst all the nations of the north of Europe. They were called by the Saxons *michel-synoth*, or great council; *michel-gemote*, or great meeting; and *witena-gemote*, meeting of wise men—by the last of which they are now most familiarly known.

The constitution of these councils cannot be known with any certainty, and there has been much controversy on the subject, and especially as to the share of authority enjoyed by the people. Different periods have been assigned for their admittance into the legislature. Coke, Spelman, Camden, and Prynne agree that the commons formed part of the great synods or councils before the Conquest; but how they were summoned, and what degree of power they possessed, is a matter of doubt and obscurity. 'The main constitution of parliament, as it now stands,' says Blackstone, 'was marked out so long ago as the seventeenth year of King John, A.D. 1215, in the great charter granted by that prince, wherein he promises to summon all archbishops, bishops, abbots, earls, and greater barons [BARONS] personally, and all other tenants in chief under the crown by the sheriff and bailiffs, to meet at a certain place, with forty days' notice, to assess aids and scutages when necessary; and this constitution has subsisted, in fact at least, from the year 1266, 49 Hen. III., there being still extant writs of that date to summon knights, citizens, and burgesses to parliament.' A statute, also, passed 15 Edw. II. (1322), declares that 'the matters to be established for the estate of the king and of his heirs, and for the estate of the realm and of the people, should be treated, accorded, and established in parliament, by the king and by the assent of the prelates, earls, and barons, and the commonalty of the realm, *according as had been before accustomed*.' In reference to this statute Mr. Hallam observes 'that it not only establishes by a legislative declaration the present constitution of parliament, but recognises it as already standing upon a custom of some length of time.' (*Const. Hist.*, 5.)

Constituent Parts of Parliament.

These have been treated of in separate articles, and nothing more will be attempted in this place than a brief analysis, which will bring the whole under one view. Of the king (or queen), the first in rank, nothing need be repeated.

The House of Lords is at present composed of—

Lords Spiritual.

2 archbishops (York and Canterbury)
24 English bishops
4 Irish representative bishops

Total, 30

Lords Temporal.

3 dukes of the blood royal
21 dukes
20 marquesses
113 earls
20 viscounts
211 barons
16 representative peers of Scotland
28 representative peers of Ireland

Total, 432

The number has been greatly augmented from time to time, and there is no limitation of the power of the crown to add to it by further creations. The introduction of the representative peers of Scotland and Ireland was effected on the union of those kingdoms respectively with England. The former are elected by the hereditary peers of Scotland descended from Scottish peers at the time of the Union, and sit for one parliament only; the latter are chosen for life by the peers of Ireland, whether hereditary or created since the Union. The power of the crown to create Irish peers is limited by the Act of Union, so that one only can be created when three of the peerages of Ireland have become extinct.

The present composition of the House of Commons is as follows:—

England and Wales.

159 knights of shires
341 citizens and burgesses

Total, 500

Scotland.

30 knights of shires
23 citizens and burgesses

Total, 53

Ireland.

64 knights of shires
41 citizens and burgesses

Total, 105
Total of the United Kingdom, 658.

An account of the changes effected in the parliamentary constituencies at different times, more particularly by the Reform Act, and a full view of the present system of representation, is given in the article Commons, House of.

The lords and commons originally were one assembly, but the date of their separation is not known. Sir Edward Coke states that he had seen a record, 30 Hen. I. (1130), of their degrees and seats as one body, and affirms that the separation took place at the desire of the commons. (13 *State Trials*, 1410.) Elsynge avers that 'the commons ever had a place for their consultation apart from the lords, though they did often meet and sit together in one room,' and gives several precedents in support of his position. (*Manner of Holding Parliaments*, pp. 101-104, 155.)

Power and Jurisdiction of Parliament.

1. **Legislative Authority collectively.**—The authority of parliament extends over the United Kingdom and all its colonies and foreign possessions. There are no other limits to its power of making laws for the whole empire than those which are common to it and to all other sovereign authority, the willingness of the people to obey, or their power to resist them. It has power to alter the constitution of the country, for that is the constitution which the last act of parliament has made. It may take away life by acts of attainder, and make an alien be as a natural-born subject.

Parliament does not in the ordinary course legislate directly for the colonies. For some, the queen in council legislates, and others have legislatures of their own, and propound laws for their internal government, subject to the approval of the queen in council; but these may afterwards be repealed or amended by direct statutes from this country. Their legislatures and their laws are both subordinate to the supreme power of the mother country. The constitution of Lower Canada is at the present moment (April, 1840) suspended; and a provisional government, with legislative functions and great executive powers, has been established by the British parliament. Slavery was abolished by an act of parliament in 1833 throughout all the British possessions, whether governed by local legislatures or not; but certain measures for carrying into effect the intentions of parliament were left for subsequent enactment by the local bodies, or by the queen in council. The House of Assembly of Jamaica, the most antient of our colonial legislatures, had neglected to pass an effectual law for the regulation of prisons, which became necessary upon the emancipation of the negroes, and parliament immediately interposed and passed a statute for that purpose. The Assembly were indignant at the interference of the mother country, and neglected their functions, until an act was passed by the imperial parliament suspending the constitution of Jamaica unless they resumed them.

The power of imposing taxes upon colonies for the support of the parent state was attempted to be exercised by parliament upon the provinces of North America; but that attempt was the immediate occasion of the severance of that great country from our own. The injustice and hardship of colonial taxation must be admitted; but the legal power of parliament to impose such taxes can only be restrained by its own acts conferring constitutions and privileges upon the colonies, which are all subject to its authority.

There are some subjects indeed upon which parliament, in familiar language, is said to have no right to legislate; such for instance as the Church; but no one can intend more by that expression than that it is inexpedient to make laws as to such matters. The very prayers and services of the Church are prescribed by statute. Parliament has changed the professed religion of the country, and has altered the hereditary succession to the throne. To conclude, in the words of Sir Edward Coke, the power of parliament 'is so transcendent and absolute, that it cannot be confined, either for causes or persons, within any bounds.'

2. **Distribution of Powers between King, Lords, and Commons.**—Custom and convenience have assigned to different branches of the legislature peculiar powers. These are subject to any limitation or even transference which parliament may think fit. The king swears at the coronation to govern 'according to the statutes in parliament agreed upon,' and these of course may be altered. Prerogatives of the crown which have ever been enjoyed might yet be taken away by the king, with the consent of the three estates of the realm. The king sends and receives ambassadors, enters into treaties with foreign powers, and declares war or peace, without the concurrence of lords and commons; but these things he cannot do without the advice of his ministers, who are responsible to parliament. Without entering into a view of his general prerogatives, which are treated of elsewhere [King], it will be necessary to advert to certain parliamentary functions exercised by him, and which are most important in the conduct of legislation.

Summons.—It is by the act of the king alone that parliament can be assembled. There have been only two instances in which the lords and commons have met of their own authority, namely, previously to the restoration of King Charles II. and at the Revolution in 1688.

The first act of Charles II.'s reign declared the lords and commons to be the two houses of parliament, notwithstanding the irregular manner in which they had been assembled, and all their acts were confirmed by the succeeding parliament summoned by the king; which however qualified the confirmation of them by declaring that 'the manner of the assembling, enforced by the difficulties and exigencies which then lay upon the nation, is not to be drawn into example.' In the same manner the first act of the reign of William and Mary declared the convention of lords and commons to be the two houses of parliament, as if they had been summoned according to the usual form; and the succeeding parliament recognised the legality of their acts. But although the king may determine the period for calling parliaments, his prerogative is restrained within certain limits; as he is bound by statute to [illegible] once within three years after the determination of any parliament; while the practice of providing money for the public service by annual enactments renders it compulsory upon him to meet parliament every year.

There is one contingency upon which the parliament may meet without summons, under the authority of an act of parliament. It was provided by the 6 Anne, c. 7, that 'in case there should be no parliament in being at the time of the demise of the crown, then the last preceding parliament should immediately convene and sit at Westminster, as if the said parliament had never been dissolved.' By the 37 Geo. III., c. 127, a parliament so revived would only continue in existence for six months, if not sooner dissolved.

As the king appoints the time and place of meeting, so also at the commencement of every session he declares to both houses the cause of summons by a speech delivered to them in the house of lords by himself in person, or by commissioners appointed by him. Until he has done this, neither house can proceed with any business.

The causes of summons declared do not make it necessary for parliament to consider them only, or to proceed at once to the consideration of any of them. After the speech, any business may be commenced, and the commons, in order to prove their right to act without reference to any authority but their own, invariably read a bill a first time *pro formâ* before they take the speech into consideration. Other business is also done very frequently at the same time. New writs are issued for places which have become vacant during the recess, returns are ordered, and even addresses are presented on matters unconnected with the speech. In the present session (1840) a question of privilege, arising out of the action of Stockdale against the printers of the house, was entertained before any notice was taken of her Majesty's speech.

Prorogation and Adjournment.—Parliament, it has been seen, can only commence its deliberations at the time appointed by the king; neither can it continue them any longer than he pleases. He may prorogue parliament by having his command signified in his presence by the lord chancellor or speaker of the house of lords to both houses, or by writ under the great seal, or by commission. The effect of a prorogation is at once to suspend all business until parliament may be summoned again. Not only are the sittings of parliament at an end, but all proceedings pending at the time, except impeachments by the commons, are quashed. A bill must be renewed after a prorogation, as if it had never been introduced, though the prorogation be for no more than a day. William III. prorogued parliament from the 21st October, 1689, to the 23rd, in order to renew the Bill of Rights, concerning which a difference had arisen between the two houses that was fatal to it. Owing to a rule that a bill cannot be passed in either house twice in the same session, a prorogation has been resorted to in other cases to enable a second bill to be brought in.

Adjournment is solely in the power of each house respectively. It has not been uncommon indeed for the king's pleasure to be signified, by message or proclamation, that both houses should adjourn. Either of them however may decline complying with what can be considered as no more than a request. Business has frequently been transacted after the king's desire has been made known, and the question for adjournment put in the ordinary manner.

Dissolution.—The king may also put an end to the existence of parliament by a dissolution. He is not however entirely free to define the duration of a parliament, for after seven years it ceases to exist under the statute of George I., commonly known as the Septennial Act. Before the Triennial Act, 6 Wm. and Mary, there was no limit to the continuance of a parliament, except the will of the king. Parliament is dissolved by proclamation, after having been prorogued to a certain day. This practice, according to Hatsell, 'which has now been uniform for above a century, has probably arisen from those motives that are suggested by Charles I., in his speech in 1628, "that it should be a general maxim with kings themselves only to execute pleasing things, and to avoid appearing personally in matters that may seem harsh and disagreeable."'

In addition to these several powers of calling a parliament, appointing its meeting, directing the commencement of its proceedings, determining them for an indefinite time by prorogation, and finally of dissolving it altogether, the crown has the creation of one entire branch of the legislature; together with other parliamentary powers, which will hereafter be noticed in treating of the functions of the two houses.

The judicial functions of the lords and their right to pass bills affecting the peerage which the commons may not amend, are the only properties peculiar to them, apart from their personal rights and privileges.

Taxation.—The chief powers vested in the house of commons are those of imposing taxes and voting money for the public service. Bills for these purposes can only originate in that house, and the lords may not make any alterations in them, except for the correction of clerical errors. On the opening of parliament, the king directs estimates to be laid before the house, but the amount may be varied by the commons at pleasure. Grants distinct from those proposed in the estimates cannot be made without the king's recommendation being signified. The commons will not allow the right of the lords to insert in a bill any pecuniary penalties or to alter the amount or application of any penalty imposed by themselves; but the rigid assertion of this rule was found to be attended with much inconvenience, and a standing order was made in 1831, directing the Speaker in each case to report whether the object of the lords appears to be 'to impose, vary, or take away any pecuniary charge or burthen on the subject,' or 'only to relate to the punishment of offences, and the house shall determine whether it may be expedient in such particular case to insist upon the exercise of their privilege.'

Right of determining Elections.—Another important power peculiar to the commons is that of determining all matters touching the election of their own members, and involving therein the rights of the electors. Upon the latter portion of their right a memorable contest arose between the lords and commons in 1704. Ashby, a burgess of Aylesbury, brought an action at common law against the returning-officers of that town for having refused to permit him to give his vote at an election. A verdict was obtained by him, but a judgement was given against him in the Queen's Bench, which was reversed by the house of lords upon a writ of error. The commons declared that 'the determination of the right of election of members to serve in parliament is the proper business of the house of commons, which they would always be very jealous of, and this jurisdiction of theirs is uncontested; that they exercise a great power in that matter, for they oblige the officer to alter his return according to their judgment; and that they cannot judge of the right of election without determining the right of the electors, and if electors were at liberty to prosecute suits touching their right of giving voices in other courts, there might be different voices in other courts, which would make confusion, and be dishonourable to the house of commons; and that therefore such an action was a breach of privilege.' In addition to the ordinary exercise of their jurisdiction as regarded the right of elections, the commons relied upon an act of the 7 Will. III., c. 7, by which it had been declared, that 'the last determination of the house of commons concerning the right of elections is to be pursued.' On the other hand, it was objected that 'there is a great difference between the right of the electors and the right of the elected: the one is a temporary right to a place in parliament *pro hâc vice*; the other is a freehold or a franchise. Who has a right to sit in the house of commons, may be properly cognisable there; but who has a right to choose, is a matter originally established, even before there is a parliament. A man has a right to his freehold by the common law, and the law having annexed his right of voting to his freehold, it is of the nature of his freehold, and must depend upon it. The same law that gives him his right must defend it for him, and any other power that will pretend to take away his right of voting, may as well pretend to take away the freehold upon which it depends.' These extracts from the Report of a Lords' Committee, 27 March, 1704, upon the conferences and other proceedings in the case of Ashby and White, give an epitome of the main arguments upon which each party in the contest relied. The whole of this Report, together with another of the 13 March, may be read with great interest.

Encouraged by the decision of the house of lords, five other burgesses of Aylesbury, now familiarly known as 'the Aylesbury men,' commenced actions against the constables of their town, and were committed to Newgate by the house of commons for a contempt of their jurisdiction.

They endeavoured to obtain their discharge on writs of *habeas corpus*, but did not succeed. The commons declared their counsel, agents, and solicitors guilty of a breach of privilege, and committed them also. Resolutions condemning these proceedings were passed by the lords; conferences were held, and addresses presented to the queen. At length the queen came down and prorogued parliament, and thus put an end to the contest and to the imprisonment of the Aylesbury men and their counsel.

The question which was agitated at that time has never since arisen. The commons have continued to exercise the sole right of determining whether electors have had the right to vote while inquiring into the conflicting claims of candidates for seats in parliament, and specific modes for trying the right of election by the house have been prescribed by statutes, and its determination declared to be 'final and conclusive in all subsequent elections, and to all intents and purposes whatsoever.'

Connected with the right of the commons to adjudicate upon all matters relating to elections, may be mentioned their power over the eligibility of candidates. John Wilkes was expelled, in 1764, for being the author of a seditious libel. In the next parliament (February 3, 1769) he was again expelled for another libel; a new writ was ordered for the county of Middlesex, which he represented, and he was re-elected without a contest; upon which it was resolved, on the 17th February, 'that having been in this session of parliament expelled this house, he was and is incapable of being elected a member to serve in this present parliament.' The election was declared void, but Mr. Wilkes was again elected, and his election was once more declared void, and another writ issued. A new expedient was now tried. Mr. Luttrell, then a member, accepted the Chiltern Hundreds, and stood against Mr. Wilkes at the election, and, being defeated, petitioned the house against the return of his opponent. The house resolved that although a majority of the electors had voted for Mr. Wilkes, Mr. Luttrell ought to have been returned, and they amended the return accordingly. Against this proceeding the electors of Middlesex presented a petition, without effect, as the house declared that Mr. Luttrell was duly elected. The whole of these proceedings were severely condemned, and on the 3rd of May, 1782, the resolution of the 17th of February, 1769, was ordered to be expunged from the journals as 'subversive of the rights of the whole body of electors of this kingdom.' A resolution similar to that expunged had been passed in the case of the unfortunate Hall, in 1580, as part of the many punishments inflicted upon him, which we shall have occasion to mention.

Oaths.—The power of administering oaths exercised by the lords is not claimed by the house of commons. They formerly endeavoured to attain the end supposed to be secured by the administration of an oath, by resorting to the authority of justices of the peace who happened to be members of their own body; but all such expedients have long since been abandoned, and witnesses guilty of falsehood are punished by the house for a breach of privilege, not being amenable to the laws regarding perjury. Election committees have power by statute to administer oaths, and witnesses giving false evidence are guilty of perjury.

3. Privileges.—Both houses of parliament possess various rights and privileges for the maintenance of their collective authority, and for the protection, convenience, and dignity of individual members. At the commencement of each parliament, the Speaker, on behalf of the commons, has 'laid claim to them of the king' since the reign of Henry VIII., but they appear to have been always enjoyed with equal certainty before that time. Some of them have been subsequently confirmed, modified, and even abolished by acts of parliament, but the petition of the Speaker remains unchanged, and prays for some which have been disallowed by law since the original form was adopted.

Commitment and Fines.—The power of commitment for contempt has always been exercised by both houses. It has been repeatedly brought under the cognizance of the courts, and allowed without question. Mr. Wynn, in his 'Argument,' states that there are upwards of one thousand cases of commitment by the house of commons to be found in their Journals since 1547. Breaches of privilege committed in one session may be punished by commitment in another, as in the well-known case of Murray, in 1751-2, who was imprisoned in Newgate for a libel until the end of the session, and on the next meeting of parliament was again ordered to be committed; but he had absconded in the meanwhile. Contempts of a former parliament may also be punished. The lords may commit for a definite period beyond the duration of the session or parliament; but a commitment by the commons holds good only until the close of the session.

The house of lords, in addition to the power of commitment, may impose fines. This privilege is not exercised by the commons, although there is a case in D'Ewes's 'Journals of Queen Elizabeth,' in which Mr. Hall, a member who had incurred their displeasure, by publishing a work 'very slanderous and derogatory to the general authority, power, and state of the house, and prejudicial to the validity of its proceedings in making and establishing laws,' was ordered to 'pay a fine to the queen of five hundred marks.' The house at the same time assumed a power not found to have been exercised in other cases. It committed Mr. Hall to the Tower, and ordered that he should remain there for 'six months, and until he should made retraction of the book.' This punishment was commitment for a time certain without reference to the continuance of the session, and, in the event of a refusal to retract the book, amounted to perpetual imprisonment. A practice still exists which partakes of the nature of a fine. There are certain fees payable by persons committed to the custody of the serjeant-at-arms, and it is usual on discharging them out of custody to attach the condition of the 'payment of the fees.' These fees are occasionally remitted under particular circumstances—in one case, on account of the poverty of the prisoner.

Freedom of Speech.—Freedom of speech is one of the privileges claimed by the Speaker on behalf of the commons; but it has long since been confirmed as the right of both houses of parliament by statutes. It was acknowledged in an act in the reign of Henry VIII., by which the proceedings of the stannary court with respect to Richard Strode, a member, who was fined and imprisoned by that court for having proposed a bill to regulate the tinners in Cornwall, were declared illegal, and the repetition of similar encroachments upon the privilege of parliament provided against. The language however was thought ambiguous, and it was by limiting its operation to the case of Strode that a judgment was obtained in the King's Bench against Sir John Elliot, Denzil Hollis, and Valentine, in the reign of Charles I. A true interpretation of the law was subsequently established by resolutions of both houses of parliament, and by a formal reversal of this judgment by the house of lords. The most solemn recognition of the privilege is contained in the Bill of Rights, which declares 'that the freedom of speech and debates and proceedings in parliament ought not to be impeached or questioned in any court or place out of parliament.'

There are however certain legal incidents to this privilege, which it is necessary to notice. The law presumes that everything said in parliament is with the view to the public good and necessary for the conduct of public business; but should the member publish his speech, he is viewed as author only, and if it contain libellous matter, he will not be protected by the privilege of parliament. In 1795, an information was filed against Lord Abingdon for libel. His lordship had accused his attorney, in parliament, of improper conduct in his profession. He afterwards published his speech in several newspapers at his own expense. His lordship pleaded his own cause, and contended that he had a right to print what he had, by the law of parliament, a right to speak; but Lord Kenyon said 'that a member of parliament had certainly a right to publish his speech, but that speech should not be made a vehicle of slander against any individual; if it was, it was a libel.' In 1813, a much stronger case of the same kind occurred. Mr. Creevey, a member, had made a charge against an individual in the house of commons, and incorrect reports of his speech having appeared in several newspapers, Mr. Creevey sent a correct report to an editor, requesting him to publish it in his newspaper. A jury found Mr. Creevey guilty of libel, and the court of King's Bench refused an application for a new trial; on which occasion Lord Ellenborough said 'a member of that house has spoken what he thought material, and what he was at liberty to speak, in his character as a member of that house. So far he is privileged: but he has not stopped there; but, unauthorised by the house, he has chosen to publish an account of that speech in what he has pleased to call a perverted form, and in that publication has thrown out reflections injurious to the character of an individual.'

Freedom from Arrest.—The Speaker's petition prays on behalf of the commons 'that their persons, *their estates, and servants*, may be free from arrests and all molestations.' These words are not more extensive than the privilege as formerly enjoyed, and instances in which it has been enforced may be found in nearly every page of the earlier volumes of the Journals. This privilege has however been limited by statute, the last of which (10 Geo. III., c. 50) states in the preamble that the previous laws were insufficient to obviate the inconveniences arising from the delay of suits by reason of privilege of parliament, and enacts that 'any person may at any time commence and prosecute any action or suit, &c., against any peer or lord of parliament, or against any of the knights, citizens, or burgesses for the time being, or against any of their menial or any other servants, or any other person entitled to the privilege of parliament, and no such action shall be impeached, stayed, or delayed by or under colour or pretence of any privilege of parliament.' Obedience to any rule of the courts at Westminster may be enforced by distress infinite, in case any person entitled to the benefit of such rule shall choose to proceed in that way.

The persons of members are still free from arrest or imprisonment in civil actions, but their property is as liable to the legal claims of all other persons as that of any private individual. Their servants do not enjoy any privilege or immunity whatever.

The privilege of freedom from arrest has always been subject to the exception of cases of 'treason, felony, and surety of the peace;' and though in other criminal charges each house may, if it see fit, prevent the abstraction of a member from his parliamentary duties, the case of Lord Cochrane, in 1815, will show how little protection the house of commons extends to its members in such cases. Lord Cochrane, having been indicted and convicted for a conspiracy, was committed to the King's Bench prison. He afterwards escaped, and was arrested by the marshal while sitting on the privy councillor's bench in the house of commons, on the right hand of the chair, at which time there was no member present, prayers not having been read. The committee of privileges declared that by this proceeding of the marshal of the King's Bench 'the privileges of parliament did not appear to have been violated so as to call for the interposition of the house.'

Courts of justice have committed privileged persons for contempt, and parliament has refused to protect them. By a standing order of the house of lords, 6th June, 1757, it was declared 'that no peer or lord of parliament hath privilege of peerage or of parliament against being compelled by process of the courts of Westminster hall to pay obedience to a writ of habeas corpus directed to him;' and in the case of Earl Ferrers, it was decided that an attachment may be granted if a peer refuses obedience to the writ of habeas corpus. There have been two recent cases, that of Mr. Long Wellesley in 1831, and that of Mr. Lechmere Charlton in 1837, in which members committed by the lord-chancellor for contempt have laid claims to privilege, which were not admitted by the house of commons.

Peers are always free from arrest; and as regards the commons, their privilege is supposed to exist for 40 days after every prorogation and 40 days before the next appointed meeting.

Jurisdiction of Courts of Law in Matters of Privilege.—In connection with the exercise of privilege, an important point of law arises as to the jurisdiction of courts of justice. It is one of great interest and still greater doubt at the present moment, and has at various times been the occasion of much dispute and difficulty. Each house of parliament is acknowledged to be the judge of its own privileges. Sir Edward Coke affirms, 'whatever matter arises concerning either house of parliament, ought to be examined, discussed, and adjudged in that house to which it relates, and not elsewhere.' (4 *Inst.*) But again, in the disputes in the case of the Aylesbury men, which has been already referred to, the lords communicated to the commons at a conference a resolution, 'that neither house of parliament have power by any vote or declaration to create to themselves new privileges not warranted by the known laws and customs of parliament;' which was assented to by the commons. (14 *Commons' Journals*, 555, 560.) The degree of jurisdiction to be exercised by the courts and the proper mode of dealing with causes involving matters of privilege, it would indeed be difficult to determine, after the inconsistencies which have been shown in practice and the great variety of opinions expressed by learned men. No more than a concise statement of a few cases will be needed to show the difficulties in which the question is involved.

First, as to the right of courts to inquire into the existence and nature of privileges claimed by either house of parliament. Coke lays it down, that 'judges ought not to give any opinion of a matter of parliament, because it is not to be decided by the common laws, but *secundum leges et consuetudinem parliamenti*; and so the judges in divers parliaments have confessed.' (4 *Inst.*, 15.) When Paty, one of the Aylesbury men, was brought before the Queen's Bench on a writ of habeas corpus, Mr. Justice Powell said 'this court may judge of privilege, but not contrary to the judgment of the house of commons;' and again, 'this court judges of privilege only incidentally; for when an action is brought in this court, it must be given one way or other.' (2 Lord Raymond, 1105.) The opinions of other judges to the same effect, expressed at different times, might also be given. The words contained in the Bill of Rights, that the 'debates and *proceedings* in parliament ought not to be impeached or questioned in any court or place out of parliament,' are generally relied upon as confirmation of this doctrine. If this view were always taken of the question, little difference between parliament and the courts of law would arise. The course would be simple. Whatever action might be brought would be determined in a manner agreeable to the house whose privileges were questioned; and if the lords, in case of appeal, were to abide by the same rule, there would be no dissensions. But as such unanimity of opinion has not always existed, there has been a clashing of jurisdictions which nothing probably but a statute can prevent for the future.

A judgment was obtained against Sir W. Williams, the Speaker of the house of commons, in the second year of James II., for having caused a paper entitled 'Dangerfield's Narrative' to be printed by order of the house. This the house declared to be 'an illegal judgment,' and against the freedom of parliament. A bill was also brought in to reverse the judgment, but it miscarried in three different sessions. (10 *Commons' Journals*, 177, 205.)

The denial of the exclusive jurisdiction claimed by the commons in 1704, in respect of the right of elections, as stated above, is another important occasion in which the privilege of the commons has clashed with the judgments of legal tribunals.

The only other case which need be mentioned in this place is that of Stockdale v. Hansard. Messrs. Hansard, the printers of the house of commons, had printed, by order of that house, the Reports of the Inspectors of Prisons, in which a book published by Stockdale was described in a manner which he conceived to be libellous. He brought an action against Messrs. Hansard during a recess, but had a verdict against him upon a plea of justification, as the jury considered the description of the work in question to be accurate. On that occasion Lord Chief Justice Denman, who tried the cause, made a declaration adverse to the privileges of the house, which Messrs. Hansard had set up as part of their defence. In his direction to the jury, his lordship said 'that the fact of the house of commons having directed Messrs. Hansard to publish all their parliamentary reports is no justification for them, or for any bookseller who publishes a parliamentary report containing a libel against any man.' In consequence of these proceedings, a committee was appointed, on the meeting of parliament in 1837, to examine precedents and to ascertain the law and practice of parliament in reference to the publication of papers printed by order of the house. The result of these inquiries was the passing of the following resolutions by the house:—

'That the power of publishing such of its reports, votes, and proceedings as it shall deem necessary or conducive to the public interests is an essential incident to the constitutional functions of parliament, more especially of this house as the representative portion of it.

'That by the law and privilege of parliament, this house has the sole and exclusive jurisdiction to determine upon the existence and extent of its privileges, and that the institution or prosecution of any action, suit, or other proceeding, for the purpose of bringing them into discussion or decision before any court or tribunal elsewhere than in parliament, is a high breach of privilege, and renders all parties concerned therein amenable to its just displeasure, and to the punishment consequent thereon.

'That for any court or tribunal to assume to decide upon matters of privilege inconsistent with the determination of either house of parliament is contrary to the law of parliament, and is a breach and contempt of the privileges of parliament.'

Notwithstanding these resolutions, Stockdale immediately commenced another action. The Queen's Bench decided against the privileges of the house. A third action was then brought by Stockdale, and not being defended, judgment went by default, and the damages were assessed in the sheriff's court.

As yet the jurisdiction of the courts to inquire into the privileges of parliament and to give judgments inconsistent with its determination has alone been touched upon; the next question is as to the mode of dealing with actions involving privilege when brought in the courts. The practice has been extremely various and inconsistent, as a rapid view of it will show. An action had been brought against Topham, the serjeant-at-arms, for executing the orders of the house of commons in arresting certain persons. Topham pleaded *to the jurisdiction of the court*, but his plea was overruled, and judgment was given against him. The house declared the judgment to be a breach of privilege, and committed Sir F. Pemberton and Sir T. Jones, the judges, to the custody of the serjeant. (10 *Commons' Journals*, 227.) In speaking of this proceeding, Lord Ellenborough expressed his surprise 'that a judge should have been questioned for having given a judgment which no other judge who ever sat in his place could have differed from.'

In the case of Ashby and White, so often referred to, the commons declared 'that whoever shall presume to commence any action, and all attorneys, solicitors, counsellors, and serjeants-at-law soliciting, prosecuting, or pleading in any case, are guilty of a high breach of the privileges of this house.' The effect of this resolution, if obeyed, would be to prevent the courts from coming to any decision at all upon matters of privilege, as an action would be stopped at its commencement; but the principle has not been adhered to.

When Sir Francis Burdett brought actions against the Speaker and the serjeant-at-arms, in 1810, for taking him to the Tower in obedience to the orders of the house of commons, they were directed to plead, and the attorney-general received instructions to defend them. A committee at the same time reported a resolution 'that the bringing these actions for acts done in obedience to the orders of the house is a breach of privilege,' but it was not adopted by the house. The actions proceeded in the regular course, and the court of King's Bench sustained and vindicated the authority of the house.

It has been already said that Stockdale's first action was brought when parliament was not sitting. Having no specific directions therefore from the house, Messrs. Hansard pleaded to the action. On the general issue they proved the orders of the house, which were held to be no protection, but had judgment upon a plea which would have availed them equally had they printed the report complained of on their own account. Notwithstanding its resolutions, the house, on being acquainted with this action, instead of acting upon them when a second was commenced, reverted to the precedent of 1810, and directed Messrs. Hansard to plead, and the attorney-general to defend them. In this case nothing but the privileges of the house of commons were relied upon in defence of Messrs. Hansard, and the court of Queen's Bench unanimously decided against them. Still the house of commons was reluctant to act upon its own resolutions, and instead of punishing the plaintiff and his legal advisers, 'under the special circumstances of the case,' it ordered the damages and costs to be paid. The resolutions however were not rescinded, and it was then determined that in case of future actions, Messrs. Hansard should not plead at all; and that the parties should suffer for their contempt of the resolutions and authority of the house. Another action was brought by the same person and for the same publication. Messrs. Hansard did not plead, the judgment went against them by default, and the damages were assessed by a jury in the sheriff's court at 600*l*. The sheriffs of Middlesex levied for that amount, but having been served with copies of the resolutions of the house, they were anxious not to pay the money to Stockdale until they were unable to delay the payment any longer. At the opening of the session of parliament in 1840, the money was still in their hands. The House of Commons at once entered on the consideration of these proceedings, which had been carried on in spite of its resolutions, and in the first place committed Stockdale to the custody of the serjeant-at-arms. The sheriffs were desired to refund the money, and, on their refusal, were also committed. Mr. Howard, the solicitor of Mr. Stockdale, was suffered to escape with a reprimand. The sheriffs retained possession of the money until an attachment was issued from the Queen's Bench, when they paid it over to Stockdale. Stockdale, while in prison, commenced a fourth action by the same solicitor, and with him was committed to Newgate for the offence; and Messrs. Hansard were again ordered not to plead. Once more judgment was entered up against them, and a writ of inquiry of damages issued.

Mr. France, the under-sheriff, upon whom the execution of this writ devolved, having been served with the resolutions of the commons, expressed by petition his anxiety to pay obedience to them, and sought the protection of the house. He then obtained leave to show cause before the court of Queen's Bench on the fourth day of Eastern term why the writ of inquiry should not be executed. Meanwhile the imprisonment of the plaintiff and his attorney did not prevent the prosecution of further actions. Mr Howard's son, and his clerk, Mr. Pearce, having been concerned in conducting such actions, were committed for the contempt, and Messrs. Hansard, as before, were instructed not to plead. At length as there appeared to be no probability of these vexatious actions being discontinued, a bill was introduced into the commons, by which proceedings, criminal or civil, against persons for publication of papers printed by order of either house of parliament, are to be stayed by the courts, upon delivery of a certificate and affidavit to the effect that such publication is by order of parliament. This bill passed the commons, and was sent up to the lords, by whom it was returned with certain amendments, to which the commons agreed. In executing the Speaker's warrant for taking Mr. Howard into custody, the messengers had remained some time in his house, for which he brought an action of trespass against them. As it was possible that they might have exceeded their authority, and as the right of the house to commit was not directly brought into question, the defendants were, in this case, instructed to plead; although a clause for staying further proceedings in the action was contained in the bill which was pending, at that time, in the house of lords; by whom however it was afterwards omitted.

FORMS OF PROCEDURE.

Meeting of Parliament: Preliminary Proceedings.—On the meeting of a new parliament it is the practice for the lord chancellor, with other peers appointed by commission under the great seal for that purpose, to open the parliament by stating 'that her Majesty will, as soon as the members of both houses shall be sworn, declare the causes of her calling this parliament; and it being necessary a Speaker of the house of commons should be first chosen that you, gentlemen of the house of commons, repair to the place where you are to sit, and there proceed to the appointment of some proper person to be your Speaker; and that you present such person whom you shall so choose here, to-morrow (at an hour stated) for her Majesty's royal approbation.' The commons then proceed at once to the election of their Speaker. If any debate arises, the clerk at the table acts as Speaker, and standing up, points to the members as they rise. He also puts the question. When the Speaker is chosen, his proposer and seconder conduct him to the chair, where, standing on the upper step, he thanks the house and takes his seat. It is usual for some members to congratulate him when he has taken the chair. As yet he is only Speaker elect, and as such presents himself on the following day, in the house of lords, and acquaints the lords commissioners that the choice of the commons has 'fallen upon him,' that he feels the difficulties of his high and arduous office, and that, 'if it should be her Majesty's pleasure to disapprove of this choice, her majesty's faithful commons will at once select some other member of the house better qualified to fill the station than himself.' It is stated by Hatsell, that there have been only two instances 'in which neither this form, of having the royal permission to proceed to the election of a Speaker, nor the other, of the king's approbation of the person elected, have been obser

The first is the election of Sir Harbottle Grimstone, on the 25th of April, 1660, to be Speaker of the Convention Parliament which met at the Restoration; the other, is the election of Mr Powle, 22nd January, 1688-9, in the Convention Parliament at the Revolution.' The only instance of the royal approbation being refused is in the case of Sir Edward Seymour in 1678. Sir John Topham indeed was elected Speaker in 1450, but his excuse was admitted by the king, and another was chosen by the commons in his place. In order to avoid a similar proceeding on the part of the king, Sir Edward Seymour, who knew that it had been determined to accept his excuse, omitted the usual form.

When the Speaker has been approved, he lays claim on behalf of the commons, 'by humble petition, to all their ancient and undoubted rights and privileges,' which being confirmed, the Speaker with the commons retires from the bar of the house of lords.

Both houses then proceed to take the oaths required by law. In the commons the Speaker takes them before any other member. Three or four days are usually occupied in this duty before the queen declares to both houses, in person or by commission, the causes of calling the parliament. From this time business proceeds regularly. The first thing usually done in both houses is to vote an address in answer to the speech from the throne.

Before any business is undertaken, prayers are read; in the house of lords by a bishop, and in the commons by their chaplain. The former usually meet at five o'clock in the afternoon, the latter at four.

Conduct of Business, Divisions, &c.—In the house of lords business may proceed when three peers are present, but forty members are required to assist in the deliberations of the lower house. If that number be not present at four o'clock in the afternoon, or if notice be taken, or if it appear on a division, that less than that number are present, the Speaker adjourns the house until the next sitting day. In both houses all questions are decided by a majority, but in the lords proxies are counted, while in the commons none may vote but those present in the house when the question is put by the Speaker or chairman. When any question arises upon which a difference of opinion is expressed, it becomes necessary to ascertain the numbers on each side. In the lords, the party in favour of the question are called 'content,' and that opposed to it, 'not-content.' In the commons these parties are described as the 'ayes' and 'noes.' When the Speaker cannot decide by the voices which party has the majority, or when his decision is disputed, a division takes place. This is effected in the lords by sending the 'contents' or 'non-contents,' as the case may be, to the other side of the bar, and leaving one party in the house. Each party is thus counted separately. The practice in the other house, until 1836, was to send one party forth into the lobby, the other remaining in the house. Two tellers for each party then counted the numbers, and reported them. In 1836 it was thought advisable to adopt some mode of recording the names of members who voted, and for this purpose several contrivances were proposed. The one adopted and now in operation is this. There are two lobbies, one at each end of the house; on a division the house is entirely cleared, one party being sent to each of the lobbies. Two clerks are stationed at each of the entrances to the house, holding lists of the members in alphabetical order printed upon large sheets of thick pasteboard so as to avoid the trouble and delay of turning over pages. While the members are passing into the house again, the clerks place a mark against each of their names, and the tellers count the number. These sheets of pasteboard are sent off to the printer, who prints the marked names in their order; and the division lists are then delivered on the following morning together with the votes and proceedings of the house. This plan has been quite successful: the names are taken down with great accuracy, and very little delay is occasioned by the process.

In committees of the whole house, divisions are taken by the members of each party crossing over to the opposite side of the house, unless five members require that the division shall be taken in the usual manner.

In addition to the power of expressing assent or dissent by a vote, peers may record their opinion and the grounds of it by a 'protest,' which is entered in the Journals, together with the names of all the peers who concur in it.

When matters of great interest are to be debated in the upper house, the lords are 'summoned;' and in the house of commons an order is occasionally made that the house be called over, and members not attending when their names are called, are reported as defaulters, and ordered to attend on another day, when, if they are still absent and no excuse be offered, they are sometimes committed to the custody of the serjeant-at-arms.

The business which occupies nearly the whole attention of both houses (if we except the hearing of appeals by the lords and the trial of controverted elections by the commons) is the passing of bills; and the mode of proceeding with respect to them may be briefly described in the first place.

Bills, Public and Private.

Bills are divided into two classes—such as are of a public nature affecting the general interests of the state, and such as relate only to local or private matters. The former are introduced directly by the motions of members; the latter are brought in upon petitions from the parties interested, after the necessary notices have been given and all forms required by the standing orders have been complied with.

With few exceptions, public bills may originate in either house, unless they be for granting supplies of any kind, or involve directly or indirectly the levying or appropriation of any tax or fine upon the people. The exclusive right of the commons to deal with all legislation of this nature affects very extensively the practice of introducing private bills into either house. Thus, all those which authorise the levying of local tolls or rates are brought in upon petition to the lower house. These compose by far the greater part of all private bills. All measures of local improvement, whether for enclosing lands, lighting, watching, and improving towns, establishing police, or making roads, bridges, railways, canals, or other public works, originate in the commons. On the other hand, many bills of a personal nature are always sent down from the lords, such as bills affecting private estates, for dissolving marriages, and for the naturalization of aliens. As a question of principle it is perhaps unavoidable that so large a proportion of bills must begin in one house, but much obstruction to business and a very unequal division of labour are the results of the practice. Bills affecting the peerage must originate in the lords, and acts of grace with the crown, where the prerogative of mercy is vested.

Progress of Bills: Public Bills.—Motions for leave to bring in bills of a public nature are not very frequently refused. The more usual time for opposing any measure in its progress is on the second reading, when all the provisions are known, and the general principle and effect of them may be considered. When leave is given to bring in a bill, certain members are ordered to prepare it, being the proposer and seconder of the motion, to whom others are sometimes added. It is then brought in and read a first time, and a day is fixed for the second reading, which generally leaves a sufficient interval for the printing and circulation of the bill.

It has been already said that the second reading is the occasion on which a bill is more particularly canvassed. Its principle is at that time made the subject of discussion, and if it meet with approval, the bill is committed, either to a committee of the whole house or to a select committee, to consider its several provisions in detail. A committee of the whole house is in fact the house itself, in the absence of the Speaker from the chair; but the rule which allows members to speak as often as they think fit, instead of restricting them to a single speech, as at other times, affords great facilities for the careful examination and full discussion of details. The practice of referring bills of an intricate and technical description to select committees has become very prevalent of late years, and might be extended with advantage. Many bills are understood by a few members only, whose observations are listened to with impatience, and thus valuable suggestions are often withheld in the house, which in a committee might be embodied in the bill. By leaving such bills to a select committee, the house is enabled to attend to measures more generally interesting, while other business, of perhaps equal importance, is proceeding at the same time; and it has always the opportunity of revising amendments introduced by the committee.

Before a bill goes into committee there are certain blanks for dates, amount of penalties, &c., which are filled up in this stage. Bills of importance are often recommitted, or in other words, pass twice, and even in some instances three or four times through the committee. When the proceedings in committee are terminated, the bill is reported with the amendments to the house, on which occasion they are agreed to, amended, or disagreed to, as the case may be. If many amendments have been made, it is a common and very useful practice to reprint the bill before the report is taken into consideration. After the report has been agreed to, the bill with the amendments is ordered to be engrossed previous to the third reading. A proposition was made not long since, but without success, for discontinuing the custom of engrossment upon parchment, and for using an examined copy of the printed bill, signed by the clerk of the house, for all the purposes for which the engrossed copy is now required.

The third reading is a stage of great importance, on which the entire measure is reviewed, and the house determines whether, after the amendments that have been made on previous stages, it is fit on the whole to pass and become law. The question, 'that this bill do pass,' which immediately succeeds the third reading, is usually no more than a form, but there have been occasions on which that question has been opposed, and even negatived. The title of the bill is settled last of all.

An interval of some days usually elapses between each of the principal stages of a bill; but when there is any particular cause for haste, and there is no opposition, these delays are dispensed with, and the bill is allowed to pass through several stages, and occasionally through all, on the same day.

This statement of the progress of bills applies equally to both houses of parliament. There is however a slight distinction in the title of a bill while pending in the lords, which is always 'intituled an act,' whether it has originated in the lords or has been brought up from the commons.

When the commons have passed a bill, they send it to the lords by one of their own members, who is usually accompanied by others. The lords send down bills by two masters in chancery; unless they relate to the crown or the royal family, in which case they are generally sent by two judges.

Private Bills.—In deliberating upon private bills parliament may be considered as acting judicially. The conflicting interests of private parties, the rights of individuals, and the protection of the public have to be reconciled. Care must be taken, in furthering an apparently useful object, that injustice be not done to individuals, although the public may derive advantage from it. Vigilance and caution should be exercised lest parties professing to have the public interests in view should be establishing, under the protection of a statute, an injurious monopoly. The rights of landowners amongst themselves, and of the poor, must be scrutinised in passing an enclosure bill. Every description of interest is affected by the making of a railway. Land, houses, parks, and pleasure-grounds are sacrificed to the superior claim of public utility over private rights. The repugnance of some proprietors to permit the line to approach their estates—the eagerness of others to share in the bounty of the company and to receive treble the value of their land, embarrass the decision of parliament as to the real merits of the undertaking, which would be sufficiently difficult without such contentions. If a company receive authority to disturb the rights of persons not interested in their works, it is indispensable that ample security be taken that they are able to complete them so as to attain that public utility which alone justified the powers being entrusted to them. The imprudence of speculators is to be restrained, and unprofitable adventures discountenanced, or directed into channels of usefulness and profit. In short, parliament must be the umpire between all parties, and endeavour to reconcile all interests.

The inquiries that are necessary to be conducted in order to determine upon the merits of private bills are too extensive for the house to undertake, and it has therefore been usual to delegate them to committees. To prevent parties from being taken by surprise, the standing orders require certain notices to be given (to the public by advertisement, and to parties interested by personal service) of the intention to petition parliament. The first thing which is done by the commons on receiving the petition therefore is to inquire whether these notices have been properly given, and if all other forms prescribed by the standing orders have been observed. This inquiry is confided to a committee, who report their determination to the house. It will be necessary here to explain the constitution of this committee. Until very recently it was the practice for the Speaker to prepare 'lists' of members who were to form committees on bills relating to particular counties, in such a manner as to combine a fair proportion of members connected with the locality, with the representatives of places removed from any local influence or prejudice. Each of these lists consisted of upwards of a hundred members, any five of whom formed the committee. This system was liable to many objections. The number of the committee was too great to allow any responsibility to attach to the members. They were canvassed to vote by each of the opposing parties without having heard the evidence or arguments on either side; and were sometimes induced to crowd into the committee-room and reverse decisions which had been arrived at after long and patient inquiry. These evils led to an experiment which has not long been tried, but which is undoubtedly an improvement upon the former system. All petitions for private bills are referred to the same select committee which is appointed at the beginning of each session, and is composed of members whose habits of business and practical acquaintance with this branch of legislation constitute them a tribunal in every respect superior to the old list committees. A uniform construction of the standing orders is more likely to be maintained by one committee than by several; and partiality in any one case is scarcely conceivable in a body which has to decide upon all.

The report which this committee makes to the house is simply whether the standing orders have been complied with or not. If it be favourable, leave is at once given to bring in the bill; if not, it is referred to another committee also appointed at the beginning of the session, and called the 'committee on standing orders,' whose province it is to inquire into the circumstances of the case, and report their opinion as to the propriety of dispensing with the standing orders, of requiring notices, or imposing new conditions. If this committee decide that the parties are not entitled to indulgence, it is still competent for the house to relax its standing orders, as it does not by any means delegate its authority; yet in practice the report is final. Attempts are sometimes made to overrule it, but never, we believe, with success.

When nothing has occurred to obstruct the progress of the bill, it is read a first time; after which seven clear days must elapse before the second reading, the bill being printed and delivered to members in the interval. The principle is now considered by the house, as in the case of public bills, and if the question for reading the bill be carried, it is then committed to a select committee. The constitution of committees on petitions has already been explained. While the list committees were resorted to, both the petition and the bill itself were referred to the same committee, but at present a new mode of appointing committees is in operation. It has been tried for a short time only, and must be tested by further experience before any decided opinion can be given upon its merits. The lists which have already been described are much reduced in number, and a committee of selection is appointed, to whom members upon the list must signify their intention to attend throughout the whole proceedings before they are permitted to vote. The committee of selection have power also to add to the Speaker's list any member who declares that his constituents are locally interested in the bill, provided they be satisfied as to the reality of such interest. They then add a certain number of other members not locally interested, in such a proportion as they may think fit.

In committee, the bill, if opposed, undergoes a severe examination. Petitions against it are presented to the house and referred to the committee, who hear counsel and examine witnesses. The principle of the bill has been by no means established by the second reading, for the preamble is discussed in the committee, and if it be determined by them that it has not been proved, there is an end of the bill. The report is ordered to lie upon the table, and generally no further notice is taken of it. The house indeed seems to delegate its authority more entirely to the committee on a bill than to any other committee, as it allows them to decide against a principle in favour of which it has already declared an opinion: however it has sometimes interfered in a manner which will be best explained by briefly detailing the cases. In 1836 the committee on the Durham (South-West) Railway Bill reported, according to the usual form, that the preamble had not been proved to their satisfaction; upon which they were ordered to re-assemble for the purpose of reporting specially the preamble, and the evidence with reasons in detail on which they had come to their conclusions. The detailed report was accordingly made, but the decision of the committee was still further questioned. In 1837 the bills for making four distinct lines of railway to Brighton had been referred to one committee. An unprecedented contest arose between the promoters of the competing lines; and at length it was apprehended that all the bills would be lost by the combination of three of the parties against each of the lines on which the committee would have to determine separately. This consequence was prevented by an instruction to the committee to 'make a special report of the engineering particulars of each of the lines, to enable the house to determine which to send back for the purpose of having the landowners heard and the clauses settled.'

If the committee allow that the allegations of the preamble have been proved, they proceed to consider the bill clause by clause. But before we quit the subject of the preamble, the modern practice concerning railway bills may be adverted to. There are so many grounds upon which the preamble may fail to be proved, and so many points on which the committee should be informed before a just decision can be given, that in 1836 a rule was established which obliges the committee to report in detail. On receiving the report, the house is now acquainted with the chief particulars from which the expediency of the measure may be collected. The length of the line,—the probable expenses of the works, and the sufficiency of the estimates,—the revenue expected from passengers and from agricultural produce or merchandise, with the grounds of the calculation,—the engineering difficulties—the gradients and curves, are all distinctly stated. This system might be extended, with great advantage, to other classes of bills; but is confined at present to railway bills alone. Much attention has been paid of late to the improvement of the modes of conducting private business, and it is not improbable that detailed reports may form part of the future recommendations of committees, on whom the task of suggesting further improvements may be imposed.

By a standing order, 14th December, 1837, parties complaining of any vote of a committee on a private bill are at liberty to petition against that particular vote, on entering into a bond with two sureties for payment of costs. A committee of seven may then be appointed, by ballot, out of their members who are chosen at the beginning of the session as 'the committee of appeal.' This power of objecting to the votes of a committee however is very rarely resorted to, and appears to be little more than nominal. There have been shown by the house some reluctance to permit any effectual appeal, and a desire to limit the application of the standing order.

It has been said that public bills are occasionally referred to select committees; these however must also pass through a committee of the whole house. Private bills are committed to select committees only. Bills for divorce, by a standing order, were committed, like public bills, to committees of the whole house, until the 12th February, 1840, when an order was made for referring them to a select committee of nine members.

It will not be necessary to pursue any further the progress of private bills, which differs only from that already described in respect of bills of a public nature, in the necessity for certain specified intervals between each stage, and for notices in the private bill office.

In the house of lords, when a private bill is unopposed, it is committed to the permanent chairman of committees, and any other peers may attend; but when a bill is to be opposed, the committee on standing orders inquires whether the standing orders have been complied with, and if so, the bill is referred to a committee of five appointed by a standing committee of five peers, to whom is confided the duty of selecting all committees on opposed bills, according to the circumstances of each case.

In order to ensure a proper acquaintance with the provisions of private bills, some of which are very voluminous, the house of commons have lately adopted a rule requiring copies of the bills to be laid before them six days before the second reading, and copies of the amendments made by the committee, before the house take the report into consideration.

Conferences between the two Houses.—The progress of bills in each house of parliament having been detailed, it only remains to describe the subsequent proceedings in case of difference between them. When a bill has been returned by either house to the other, with amendments which are disagreed to, a conference is desired by the house which disagrees to the amendment, to acquaint the other with the reasons for such disagreement; in order, to use the words of Hatsell, 'that after considering those reasons, the house may be induced, either not to insist upon their amendments, or may, in their turn, assign such arguments for having made them, as may prevail upon the other house to agree to them. If the house which amend the bill are not satisfied and convinced by the reasons urged for disagreeing to the amendments, but persevere in insisting upon their amendments, the form is to desire another conference; at which, in their turn, they state their arguments in favour of the amendments, and the reasons why they cannot depart from them; and if after such second conference the other house resolve to insist upon disagreeing to the amendments, they ought then to demand a "free conference," at which the arguments on both sides may be more amply and freely discussed. If this measure should prove ineffectual, and if, after several free conferences, neither house can be induced to depart from the point they originally insisted upon, nothing further can be done, and the bill must be lost.' An interesting occasion on which all these proceedings were successively adopted has recently occurred; a free conference had not been held since 1740, until a contest arose in 1836 upon amendments made by the lords to a bill for amending the Act for regulating Municipal Corporations.

Whether the conference be desired by the lords or by the commons, the former have the sole right of appointing the time and place of meeting. The house that seeks the conference must clearly express in their message the subject upon which it is desired, and it is not granted as a matter of course. There are many instances to be found in the Journals in which a conference has been refused, but not of late years. The reasons that are to be offered to the other house are prepared by a committee appointed for that purpose, who report them for the approval of the house. These reasons are generally very short, but in some cases arguments have been entered into at considerable length. The conference is conducted by 'Managers' for both houses, who, on the part of the house desiring the conference, are the members of the committee who have drawn up the reasons, to whom others are occasionally added. Their duty is to read and deliver the reasons with which they are entrusted to the managers of the other house, who report them to the house which they represent. At a free conference the managers on either side have more discretion vested in them, and may urge whatever arguments they think fit. A debate arose in the last free conference, to which we have just alluded, and the speeches of the managers were taken in short-hand and printed. While the conference is being held, the business of both houses is suspended until the return of the managers.

Amendments made to bills by either house are not the only occasions upon which conferences are demanded. Resolutions of importance, in which the concurrence of the other house is desired, are communicated in this manner. Reports of committees have also been communicated by means of a conference. In 1829 a conference was demanded by the commons to request an explanation of the circumstances under which a bill that had been amended by the lords had received the royal assent without being returned to the commons for their concurrence. The lords expressed their regret at the mistake, and stated that they had themselves been prepared to desire a conference upon the subject, when they received the message from the commons.

Conferences were formerly held in the Painted Chamber, but since the destruction of the houses of parliament by fire in 1834, that apartment has been appropriated to the sittings of the house of peers, and conferences now meet in one of the lords' committee rooms.

Royal Assent to Bills.—When a bill has passed both houses, it remains in the house of lords until the royal assent is given, unless it be a bill of supply, in which case it is returned to the commons. The royal assent may be signified by the king either in person or by commission. Several bills are usually allowed to accumulate before the royal assent is given, and then, if it be during a session, a commission is generally issued under the great seal for that purpose. Three of the lords commissioners, seated on a form between the throne and the woolsack in the house of lords, command their usher of the black rod to signify to the commons that their attendance is desired, upon which the commons with the Speaker come to the bar. The titles of the bills being then read, the royal assent to each is signified by the clerk of the parliament in Norman French. For a public bill the form of expression is '*Le roy le veult;*' for a private bill, '*Soit fait come il est desiree;*' upon a petition demanding a right, whether public or private, '*Soit droit fait come il est desiree.*' [PETITION OF RIGHT.] A bill of supply is carried up and presented by the Speaker, and the assent is pronounced in the words '*Le roy remercie ses bons subjects, accepte leur benevolence, et ainsi le veult.*' In an act of grace which has the royal assent before it is agreed to by the two houses, the clerk says, '*Les prelats, seigniors, et commons en ce present parliament assemblees, au nom de touts vos autres subjects remercient tres humblement vostre majestee et prient a Dieu vous doner en santé bone vie et longue.*' The form of words used to express a denial of the royal assent was '*Le roy s'avisera.*' The last occasion in which this power was exercised was in 1707, when Queen Anne refused her assent to a bill for settling the militia in Scotland.

The royal assent is rarely given in person, except at the close of a session, when the king attends to prorogue the parliament, and then he signifies his assent to such bills as may have passed since the last commission was issued: but bills for making provision for the honour and dignity of the crown, such as the bills for settling the Civil Lists, have generally been assented to by the king in person immediately after they have passed both houses.

During the Commonwealth the lord protector consented to bills in English, but on the Restoration the old form of words was reverted to, and only one attempt has been made to abolish it. In 1706 the lords passed a bill 'for abolishing the use of the French tongue in all proceedings in Parliament and courts of justice.' This bill dropped in the house of commons. An act passed in 1731, for conducting all proceedings in courts of justice in English, but no alteration was made in the old forms still in use in parliament.

Committees.—Committees are either 'of the whole house' or 'select.' The former are in fact the house itself, with a chairman instead of the lord chancellor or Speaker presiding. There is a more free and unlimited power of debate when the house is in committee, as members may speak any number of times upon the same question, from which they are restrained on other occasions. Select committees are specially appointed, generally for inquiring into particular subjects connected with legislation. It is usual to give them the 'power to send for persons, papers, and records;' but in case of any disobedience to their orders, they have no direct means of enforcing compliance, but must report the circumstances to the house, which will immediately interfere.

In case of an equality of voices, the chairman, who is chosen by the committee out of its own members, gives the casting vote. Some misconception appears to have existed as to the precise nature of the chairman's right of voting. In 1836, the house of commons was informed that the chairman of a select committee had first claimed the privilege to vote as a member of the committee, and afterwards, when the voices were equal, of giving a casting vote as chairman, and that such practice had of late years prevailed in some select committees; when it was declared by the house that, according to the established rules of parliament, the chairman of a select committee can only vote when there is an equality of voices. (91 *Commons' Journals*, p. 214.) This error was very probably occasioned by the practice of election committees, which was however confined to them, and only existed under the provisions of acts of parliament.

In 1837, some regulations were made by the house of commons for rendering select committees more efficient and responsible. The number of members on a committee was limited to fifteen. Lists of their names are to be affixed in some conspicuous place in the committee-clerk's office and the lobby. Members moving for the committee are to ascertain whether the gentlemen they propose to name will attend. To every question asked of a witness, the name of the member who asks it is prefixed in the minutes of evidence laid before the house; and the names of the members present at each sitting, and, in the event of any division, the question proposed, the name of the proposer, and the votes of each member, are entered on the minutes and reported to the house. [COMMITTEES.]

It is not intended to touch upon the elective franchise, or upon the proceedings at elections; but the mode of trying election petitions will require a notice in this place.

Trial of Election Petitions.—Before the year 1770, controverted elections were tried and determined by the whole house of commons, as mere party questions, upon which the strength of contending factions might be tested. In 1741, Sir Robert Walpole, after repeated attacks upon his government, was at last driven from office by a vote upon the Chippenham election petition. 'Instead of trusting to the merits of their respective causes,' said Mr. Grenville, in proposing the measure which has since borne his name, 'the principal dependence of both parties is their private interest among us, and it is scandalously notorious that we are as earnestly canvassed to attend in favour of the opposite sides, as if we were wholly self-elective and not bound to act by the principles of justice, but by the discretionary impulse of our own inclinations; nay, it is well known that in every contested election, many members of this house, who are ultimately to judge in a kind of judicial capacity between the competitors, enlist themselves as parties in the contention, and take upon themselves the partial management of the very business upon which they should determine with the strictest impartiality.' The principle of the Grenville Act, and of others which were passed at different times since 1770, was to select committees for the trial of election petitions by lot. By the last of these (9 Geo. IV., cap. 22), thirty-three names were balloted from the members present at the time, and each of the parties to the election was entitled to strike off eleven names, and thus reduce the number of the committee to eleven. Whatever party attended on the day appointed for a ballot in the greatest force, was likely to have a preponderance in the committee; and the expedient of chance did not therefore operate as a sufficient check to party spirit in the appointment of election committees. Partiality or incompetence was very generally complained of in the decisions of committees appointed in this manner, and in 1839 an act passed establishing a new system,—upon different principles,—increasing the responsibility of individual members, and leaving scarcely anything to the operation of chance.

The following is an outline of the present mode of selecting members for the trial of election petitions. At the beginning of a session the Speaker appoints a general committee of six members, to any or all of whom the house may object, in which case the Speaker is bound to appoint others. If by irreconcileable disagreement of opinion, or by the continued absence of more than two members, the committee, when appointed, should be unable to proceed in the discharge of its duties, or if the house should determine that it shall be dissolved, its functions are to cease. To this general committee all election petitions are referred. The names of all the members of the house are put into an alphabetical list and called over, when certain excuses are allowed to be made; but all who do not then excuse themselves from serving are bound to act as members of election committees when hereafter chosen.* This list is taken by the general committee, from which are selected six, eight, ten, or twelve members, who, on signifying their willingness to serve, are formed into 'the chairman's panel.' The list is then divided into five panels by the general committee, exclusive of the chairman, the order of which is decided by lot, and a number attached to each in the order in which it is drawn. These panels are to be corrected from time to time by the general committee, according to circumstances. The general committee gives three weeks' notice to the parties before it proceeds to appoint a committee for the trial of an election petition. At the expiration of that time it chooses, from the panel standing first in order of service, six members, whose names are read to the parties, who have power to object to any of them on grounds of disqualification specified in the act. When the six members are finally chosen, the chairman's panel appoint one of their own body to act as chairman, who is added accordingly by the general committee. The committee, when thus completed, is sworn, and proceeds to business. If it be reduced to less than six by the non-attendance of members, except it has already sat fourteen days or more, it is dissolved. It may sit with four members only, if it has met for twenty-five days, and with any number, without reference to the time during which it has met, provided all the parties give their consent. All questions are decided by a majority, and in case of an equality of voices, the chairman gives a second or casting vote.

As witnesses giving false evidence before an election committed, or guilty of perjury, it is usual for the house, when acquainted with such misconduct, to instruct the attorney-general to prosecute the parties. The same course has also been pursued with respect to persons proved to have been concerned in bribery.

The determinations of election committees are final, and are immediately carried into effect by the house. If an election be declared void, a new writ is issued; if it be decided that a member has not been duly elected and that another candidate should have been returned, the deputy clerk of the crown is ordered to attend and amend the return, after which the new member is sworn, and takes his seat; and if a petition or the opposition to it be held by the committee to have been frivolous or vexatious, the petitioner or sitting member, as the case may be, is liable to the payment of all the costs.

The last proceeding in parliament which we shall describe is that of

Impeachment.—Impeachment by the commons is a proceeding of great importance, involving the exercise of the highest judicial powers by parliament, and though in modern times it has rarely been resorted to, in former periods of our history it was of frequent occurrence. The earliest instance of impeachment by the commons at the bar of the house of lords was in the reign of Edward III. (1376). Before that time the lords appear to have tried both peers and commoners for great public offences, but not upon complaints addressed to them by the commons. During the next four reigns, cases of regular impeachment were frequent, but no instances occurred in the reigns of Edward IV., Henry VII., Henry VIII., Edward VI., Queen Mary, or Queen Elizabeth. The institution 'had fallen into disuse,' says Mr. Hallam, 'partly from the loss of that control which the commons had obtained under Richard II. and the Lancastrian kings, and partly from the preference the Tudor princes had given to bills of attainder or of pains and penalties, when they wished to turn the arm of parliament against an obnoxious subject.' Prosecutions also in the Star-chamber during that time were perpetually resorted to by the crown for the punishment of state offenders. In the reign of James I., the practice of impeachment was revived, and was used with great energy by the commons, both as an instrument of popular power and for the furtherance of public justice. Between the year 1620, when Sir Giles Mompesson and Lord Bacon were impeached, and the Revolution in 1688, there were about 40 cases of impeachment. In the reigns of William III., Anne, and George I. there were 15, and in George II. only one (that of Lord Lovat, in 1746, for high treason). The last memorable cases are those of Warren Hastings, in 1788, and Lord Melville, in 1805.

An outline of the forms observed in the conduct of impeachments may be briefly given. A member of the house of commons charges the accused of certain high crimes and misdemeanors, and moves that he be impeached. If the house agree to it, the member is ordered to go to the lords, and at their bar, in the name of the house of commons and of all the commons of the United Kingdom, to impeach the accused. A committee is then ordered to draw up articles of impeachment, which are reported to the house, and having been discussed and agreed upon, are engrossed and delivered to the lords. Further articles may be delivered from time to time. In the case of Warren Hastings the articles had been prepared before his impeachment at the bar of the house of lords. The accused sends answers to each article, which are communicated to the commons by the lords; to these, replications are returned if necessary. After these preliminaries the lords appoint a day for the trial. The commons desire the lords to summon the witnesses required to prove their charges, and appoint managers to conduct the proceedings. Westminster Hall has been usually fitted up as the court, which is presided over by the lord high steward. The commons attend with the managers as a committee of the whole house. The accused remains in the custody of the usher of the black rod, to whom he is delivered, if a commoner, by the serjeant-at-arms attending the house of commons. The managers should confine themselves to charges contained in the articles of impeachment. Mr. Warren Hastings complained of matters having been introduced which had not been originally laid to his charge, and the house resolved that certain words ought not to have been spoken by Mr. Burke. Persons impeached of high treason are entitled, by statute 20 Geo. II., c. 30, to make their full defence by counsel, a privilege which is not denied to persons charged with high crimes and misdemeanors.

When the managers have made their charges and adduced evidence in support of them, the accused answers them, and the managers have a right to reply. The lords then proceed to judgment in this manner:—The lord high steward puts to each peer, beginning with the junior baron, the question upon the first article, whether the accused be guilty of the crimes charged therein. The peers in succession rise in their places when the question is put, and standing uncovered, and laying their right hands upon their breast, answer 'guilty,' or 'not guilty,' as the case may be, 'upon my honour.' Each article is proceeded with separately in the same manner, the lord high steward giving his own opinion the last. The numbers are then cast up, and being ascertained, are declared by the lord high steward to the lords, and the accused is acquainted with the result.

(Coke's *Fourth Institute*, cap. 1; *The Sovereigne Power of Parliaments*, by W. Prynne, 1643; *Parliamentary Writs*, by W. Prynne, in four parts, 1659-1664; *Privileges of the Baronage of England when they sit in Parliament*, by John Selden, 12mo., 1642; *Modus tenendi Parliamentum*, by W. Hakewel, 1660; *Lex Parliamentaria*, by G. P., Esq., 12mo. 1690; *Constitution of Parliaments in England, deduced from the time of King Edward the Second*, by Sir John Pettus, 1680; *Original Institution, Power, and Jurisdiction of Parliaments*, by Sir M. Hale, 1707; republished by Hargrave, with preface, 1776; *Antient Right of the Commons of England*, by William Petyt, 1680; *Parliamentary and Political Tracts*, written by Sir Robert Atkins, 2nd edit., 1741; *History of the High Court of Parliament*, by T. Gordon, 1731; *Manner of holding Parliaments in England*, by Henry Elsynge, Cler. Parl., 1768; *Free Parliaments*, by Roger Acherley, 1731; Blackstone's Comm., book 1st; D'Ewes's *Journal*; *Lords' Journals*; *Commons' Journals*; *General Indexes and Calendars to Lords' Journals*, 1509-1819; *General Indexes to Commons' Journals*, 1547-1837; *Trial of Henry Lord Viscount Melville*, published by order of the House of Lords, fol., 1806; *State Trials*; *Parliamentary History*; Wynn's *Argument upon the Jurisdiction of the Commons to commit*, 1810; Hatsell's *Precedents*, new edit., 1818.)

PARLIAMENT OF IRELAND. In Ireland, as in England, from the conquest of the country by Henry II. in the latter part of the twelfth century, meetings of the barons were occasionally summoned to consult on public affairs, to which the old historians sometimes give the name of parliaments. But parliaments, in the modern sense, cannot be traced back in Ireland farther than to the latter end of the thirteenth century, or to a date about thirty years subsequent to that of the earliest parliament which is ascertained to have consisted both of lords and commons in England. Simon de Montfort's celebrated parliament, the first for which writs are extant summoning representatives of the counties and boroughs, met at Westminster in 1265 [HENRY III., vol. xii., p. 124]; and the first Irish parliament to which, as far as is known, the sheriffs were directed to return two representatives for each county was held in 1295. Representatives of boroughs in Ireland cannot be traced much higher than to the middle of the fourteenth century. They first make their appearance in 1341, and in an act or ordinance of 1359 they are spoken of as forming an essential part of the parliament.

At this time however and down to a much lower date it was only the small portion of Ireland occupied by the English settlers that was represented in the legislature. Even in the reign of Edward III. only the province of Munster and a part of Leinster were considered as shire land; they were divided into twelve counties. But in the course of the fifteenth century much the greater part of these districts had become to all intents and purposes independent of the English crown; and in the reign of Henry VII. the English dominion and the parliamentary representation were alike confined to the counties composing what was called the Pale, that is, to those of Dublin, Louth, Kildare, and Meath (then comprehending both East and West Meath), with a very few seaports beyond these limits. The vigorous measures taken under Henry VIII. and succeeding kings however gradually extended the authority of the English institutions and laws. The possessors of some of the surginal Irish peerages, after maintaining for centuries an independence as complete as that of the native chieftains themselves, were induced to give their attendance in the house of lords, and many new peerages were conferred, some on Englishmen or persons of English descent, some on the heads of the old Irish families. The twelve antient counties were all reclaimed in the reign of Henry VIII., and others were added by Mary, Elizabeth, and James, till, in the time of the last-mentioned king, the whole island was divided into thirty-two counties, as at present, each returning two representatives. Of these thirty-two counties however it is said there were seventeen in which there was not a single parliamentary borough, while in the remaining fifteen there were only about thirty. But either this account must be wrong or the common statement that James added only forty new boroughs must be an under statement, if, as appears, the entire number of the Irish commons in 1613 was 232. In this number however would be included the two representatives of Trinity College, Dublin. Subsequent new charters to boroughs augmented the house by the year 1692 to 300, at which number it remained stationary. In 1634 the number of peers was 122, and more than 500 Irish peerages were created between that date and the Union. Of course however some also became extinct.

It was only for a very short period of its existence that the Irish parliament was held to be a supreme legislature. Ireland being regarded as a conquered dependency, it was maintained that its parliament was in all respects subordinate to that of England, and subsequently to that of Great Britain, which might make laws to bind the people of the one country as well as of the other. The received legal doctrine used to be, that King John, in the twelfth year of his reign (A.D. 1210), ordained by letters-patent, in right of the dominion of conquest, that Ireland should be governed by the laws of England; in consequence of which both the common law of England and all English statutes enacted prior to that date were held to be of the same authority in Ireland as in England. With regard to English acts passed subsequently to that date, it was also held, in the first place, that Ireland was bound by all of them in which it was either specially named or included under general words. But further, inasmuch as one of the Irish acts called Poyning's Laws, passed in the tenth year of Henry VII. (A.D. 1495), in the lord-lieutenancy of Sir Edward Poyning, or Poynings, declared that all statutes 'lately' made in England should be deemed also good and effectual in Ireland, it was held that this established the authority in Ireland of all preceding English statutes whatsoever; making those enacted since the 12th of John of the same force with those enacted before that date. This however was admitted to be the last general imposition of the laws of England upon Ireland. Of the English statutes passed since the 10th of Henry VII., it was allowed that those only were binding upon Ireland in which that country was specially named or included under general words.

But the above-mentioned was only one of Poyning's laws. Others provided, as their substance is given by Blackstone (1 *Com.*, 102): '1. That before any (Irish) parliament be summoned or holden, the chief governor and council of Ireland shall certify to the king, under the great seal of Ireland, the considerations and causes thereof, and the articles of the acts proposed to be passed therein. 2, That after the king, in his council of England, shall have considered, approved, or altered the said acts, or any of them, and certified them back under the great seal of England, and shall have given licence to summon and hold a parliament, then the same shall be summoned and held; and therein the said acts so certified, and no other, shall be proposed, received, or rejected.' It was found however, in the course of time, that many inconveniences were occasioned by these severely restrictive regulations, which prevented any laws from being proposed, except only such as were drawn up before the parliament which should pass them was in being; and therefore, by the 3 & 4 Ph. and M., c. 4, it was provided that any new propositions might be certified to England for approval, even after the summons and during the session of parliament. Still this left to the parliament of Ireland nothing more than merely the power of rejecting any law proposed to it; it could neither initiate a new law nor repeal an old one, nor even amend or alter that which was offered for its acceptance. In practice however the letter of the statute was somewhat relaxed. Blackstone goes on to state that the practice in his day (some years after the middle of the last century) was, 'that bills are often framed in either house, under the denomination of "heads for a bill or bills," and in that shape they are offered to the consideration of the lord-lieutenant and privy-council, who, upon such parliamentary intimation, or otherwise upon the application of private persons, receive and transmit such heads, or reject them without any transmission, to England.' These heads of bills however really differed in nothing from bills or acts of parliament, except that, instead of the words 'Be it enacted,' the formal commencement of each paragraph or clause was, 'We pray that it may be enacted;' and the motion for presenting them scarcely differed, except in form, from the motion in the English House of Commons for leave to bring in a bill, a motion necessary in all cases to be assented to or carried in the affirmative before the actual bringing in of any bill. And as for the consent of the crown or the government, which it was necessary to obtain before either house of the Irish parliament could take up the consideration of any proposed law, with a view to its enactment, that would in practice probably be found to operate much in the same way with the assent of the crown, which even in England was necessary to give validity to any bill after it had passed both houses. In the Irish as well as in the English parliament there was in fact an opportunity of discussing the proposition without the permission of the crown. An English as well as an Irish bill required the assent of the crown before it could become law. This view of the matter has scarcely been sufficiently attended to in comparing the circumstances of the two legislatures. The practice of presenting heads of bills however was not introduced into the Irish parliament till after the Revolution. In the reign of Charles II., according to Lord Mountmorres, 'the council framed bills altogether; a negative alone on them and their several provisos was left to parliament; only a general proposition for a bill, by way of address to the lord-lieutenant and council, came from parliament:' that is to say, all that the parliament was suffered to do was simply to request that some measure might be brought in for effecting a particular object. The object might be specified, but the means by which it was to be attained or attempted, in other words, the details and whole character of the measure, were to be left to the government. With regard to these, the parliament had only the power of accepting or rejecting them in the mass.

But the dependence of Ireland upon the English crown, and the consequent subordination of the Irish legislature, were held to go still farther than to the establishment of the principle that laws might be made by the parliament of England to bind Ireland. The Irish House of Lords had entertained writs of error upon judgments in the courts of common law from the reign of Charles I., and appeals in equity from the Restoration. Nevertheless, in the year 1719, a judgment in the Court of Exchequer having been reversed by the House of Lords, the question was carried to the House of Lords of Great Britain, by which the judgment of the Court of Exchequer was affirmed. On this the Irish House of Lords resolved that no appeal lay from the Court of Exchequer in Ireland to the parliament of Great Britain. But this resolution was immediately met by an act of the British parliament, the 5 Geo. I., c. 1, declaring that 'the king's majesty, by and with the advice and consent of the lords spiritual and temporal of Great Britain in parliament assembled, had, hath, and of right ought to have full power and authority to make laws and statutes of sufficient force and validity to bind the people and the kingdom of Ireland; and that the House of Lords of Ireland has not nor of right ought to have any jurisdiction to judge of, reverse, or affirm any judgment, sentence, or decree given or made in any court within the said kingdom; and that all proceedings before the said House of Lords upon any such judgment, sentence, or decree are and are hereby declared to be utterly null and void to all intents and purposes whatsoever.'

In this state the law remained till the year 1782. In that year the statute 5 Geo. I., c. 1, was repealed by the 22 Geo. III., c. 53; and the following year the 23 Geo. III., c. 28, declared the exclusive right and authority of the Irish parliament and courts of justice in all matters of legislation and judicature for Ireland. Finally, in 1800, by the Act of Union, the 39 and 40 Geo. III., c. 67, the Irish parliauntil was extinguished; and it was enacted that the United Kingdom should be represented in one and the same parliament, to be called the parliament of the United Kingdom of Great Britain and Ireland.

The earliest Irish statutes on record are of the year 1310; but from that date there are none till the year 1429, from which time there is a regular series. The whole have been printed, and there are also abridgments by Bolingbroke and Belcher, Hunt, and others.

(Lord Mountmorres's *History of the Irish Parliament*; Blackstone's *Commentaries*; Oldfield's *Representative History of Great Britain and Ireland*; Wakefield's *Account of Ireland*; Hallam's *Constitutional History of England*.)

PARMA, DUCHY OF, a sovereign state in Northern Italy, which extends from the Apennines to the Po, and forms part of the great basin of that river. It is bounded on the north by Austrian Lombardy, from which it is divided by the course of the Po, on the east by the duchy of Modena, on the west by the Sardinian territory, and on the south partly by the Riviera of Genoa, partly by the Tuscan territory of Pontremoli, and partly by the Modenese district of Lunigiana. [MODENA.] The length of the duchy from east to west is about 80 miles, and its breadth is from 30 to 45 miles; the area is reckoned at 2280 square miles. The state of Parma consists of three territories which were formerly separate states, namely Parma, Piacenza, and Guastalla; and it is divided for administrative purposes into five districts, namely—1, Parma, which contains 32 communes and 141,270 inhabitants; 2, Piacenza, 30 communes and 127,140 inhabitants; 3, Borgo San Donnino, 25 communes and 124,300 inhabitants; 4, Borgo Taro, 11 communes and 43,650 inhabitants; 5, Guastalla, 4 communes and 29,240 inhabitants. The whole population of the state is 465,520 inhabitants, of whom about 300,000 live in the plain of the Po, 47,000 in the hilly part of the country along the lower offsets of the Apennines, and 118,000 in the highlands or mountains and valleys of the Apennines. (Serristori, *Statistica d'Italia*, 1836.) The mountain region, which constitutes about one-third of the whole country, is rugged, poor in produce, and bleak in winter; the forests of chestnut-trees which clothe the sides of the mountains supply the inhabitants with their chief article of food. Thousands of these highlanders quit their homes every year, many to seek employment in other and often distant countries, whilst others emigrate with their flocks to pass the winter in the lowlands. Many of the Italian boys who go about England and France with organs, monkeys, &c., come from the mountains of Parma. The lower hills and plains, which extend between the Apennines and the Po, and along the southern bank of that river, are very fertile, well cultivated, and populous; the lands have the advantage of a regular system of artificial irrigation by means of canals and sluices, as in Piedmont. The pasture-lands are remarkably rich. The principal products are corn of every kind, part of which is exported; pulse, fruit, wine, some of which is of a superior kind; silk, wool, cattle, and poultry. The horned cattle of the state of Parma are remarkably fine, and considerable numbers are exported. The rich cheese, known all over Europe by the name of Parmesan, is not made in the state of Parma, but in the province of Lodi in the Milanese territory; the name of Parmesan has been given to it, as it is said, because at one time Parma used to be the great mart for its sale. Good cheese however is made in the territory of Parma. The mineral wealth of the country consists of iron and copper mines near Bardi, where there are iron furnaces; salt-springs near Salso Maggiore, from which 10,000 cwt. of salt are made yearly; stones for lithography; marble and alabaster. The manufactures are few, and consist of paper, gunpowder, woollen cloth, glass, and delft ware.

The Ligurian Apennines, which in the Eastern Riviera are grouped in large masses, covering a considerable surface of country between the sources of the Scrivia, the Trebbia, the Nure, and the Taro, enter the state of Parma from the south; the central ridge runs in an eastern direction along the southern boundary of the duchy, separating the sources of the Taro, which run into the Po, from those of the Magra, which flows into the Mediterranean, and detaching various offsets to the north-east towards the Po. Between these offsets flow numerous streams, all of which are affluents of the Po; and though nearly dry in seasons of drought, become impetuous torrents during the rains. The first stream on entering the state of Parma from the west by the high road from Alessandria and Voghera to Piacenza, is the Tidone, which has a short course, the Apennines here approaching near to the Po. Farther to the east is the Trebbia, a larger stream, which has its sources at Montebruno, in the Apennines of the Riviera of Genoa, and flows northwards by Bobbio, a small town and a bishop's see in the Sardinian territory. Bobbio was once celebrated for its monastery, one of the oldest in Italy, now suppressed, and for its library, among the MSS. of which, transferred to the Ambrosian library at Milan, have been found several palimpsests, deciphered by Mai. The Trebbia then enters the state of Parma, and after a course of about 50 miles joins the Po above Piacenza. The Trebbia has an historical name. On the banks of this river Hannibal defeated the consul Sempronius; and here also Suwarrow defeated the French under Macdonald after three days' desperate fighting, on the 17th, 18th, and 19th of June, 1799, in which the French lost 6000 killed or wounded, and 3000 prisoners, whilst the Austro-Russians had about an equal number of killed and wounded. East of the Trebbia flows the Nure, which enters the Po below Piacenza. Farther east is the Taro, the largest river of the state of Parma, which rises in the Ligurian Apennines, and after flowing through a deep and long valley called by its name, and passing by Fornovo (where Charles VIII. of France, in his retreat, defeated the Venetians and their allies, in July, 1495), enters the plain of Parma near Castel Guelfo, and joins the Po after a winding course of about 60 miles. A road leads from the Val di Taro to Pontremoli and Sarzana in the valley of the Magra, passing over the Apennines of La Cisa at an elevation of about 3000 feet. The other rivers of the duchy are the Parma, which flows through the capital, and the Lenza, which forms the boundary between Parma and Modena.

The principal towns are:—1, PARMA; 2, PIACENZA; 3, Borgo San Donnino, a bustling town in a fertile plain, with 3000 inhabitants, a bishop's see, a gymnasium, and a clerical seminary; 4, Fiorenzuola, with 3000 inhabitants and a gymnasium; 5, Borgo Taro, the chief town of a district in the highlands of the Apennines, with about 1600 inhabitants, two elementary schools, and an old castle. The fortress of Compiano, situated in the neighbouring mountains, was one of Napoleon's state prisons for political offenders. 6, Guastalla, situated on the river Crostolo, not far from the Po, at the eastern extremity of the state; its small territory is confined between the Modenese state and the Po; it is a bishop's see, has a cathedral, a clerical seminary, a public library of 6000 volumes, and about 3000 inhabitants. Guastalla was for a long time a separate duchy, the history of which has been written by Father Affò, the historian of Parma. A very good map of the state of Parma was published at Milan in 1828.

PARMA, the capital of the duchy of Parma, situated in a fine plain about 12 miles south of the Po, is rather more than four miles in circumference, and is surrounded by walls and ditches; it is a bishop's see, and has 35,000 inhabitants. The streets are wide and straight, but appear somewhat dull and deserted. Parma has a 'scuola superiore,' or lyceum, with chairs of theology, medicine, and philosophy, attended by about 300 students; a secondary or grammar school, two colleges for boarders, besides a military college, a school for the arts, a house of education for young ladies, seventeen elementary schools for boys and seven for girls. The public library, which was opened in 1770, contains 80,000 printed volumes and 4000 MSS.; it was increased in 1816 by the purchase of the library of the Hebraist De Rossi, consisting of 3400 volumes, many of which are Hebrew and other Oriental MSS. (*Manuscripti Cod. Hebraici Biblioth. J. Bapt. De Rossi, accurate ab eodem descripti et illustrati*, 3 vols. 8vo., Parma, 1803-4.) Among the curiosities in the Parma library is a Koran which was found in the tent of the grand-vizier Kara Mustapha when he was defeated by Sobiesky under the walls of Vienna, and a Hebrew psalter which once belonged to Luther, with his interlinear and marginal annotations. The library of Parma has had in succession three learned librarians, well known for their literary works, Paciaudi, Affò, and Pezzana. The museum has 20,000 medals, and many inscriptions, bronzes, and other remains of antiquity, dug up at Veleia (VELEIA), an ancient town situated at the foot of the Apennines, south of Piacenza, near the village of Macinesso, not far from the river Nure.

The Ducal Gallery has many valuable paintings by Correggio, Guercino, the Caracci, Parmigiano, and other great masters: among the rest is the celebrated St. Jerome, by Correggio, which was sent to Paris by Bonaparte, but was restored in 1815; and the beautiful Madonna, called Della Scodella, another masterpiece of that great artist. The ducal palace has nothing remarkable in its architecture.

Most of the churches of Parma are adorned with paintings by Correggio. The most remarkable buildings are:—the cathedral; the Baptistery, which is built of marble and adorned with numerous statues and frescoes; St. John the Evangelist; l'Annunziata; and la Madonna della Steccata, which contains the tombs of the dukes of Parma, among others that of Alessandro Farnese. In the convent of St. Paul is an apartment exquisitely painted by Correggio, and the Palazzo del Giardino is adorned with frescoes by Agostino Carracci and Cignani. The great theatre Farnese, the largest in Italy, has not been used for many years, and is now in a dilapidated state. A new theatre, of more moderate dimensions, and better suited to a town of the size of Parma, was finished in 1829. The printing establishment of the late Bodoni deserves to be visited; his splendid editions have however much fallen in price of late years. Several palaces belonging to the nobility also deserve notice.

Parma has a Monte di Pietà, founded in 1488 by Father Bernardino da Feltre, a philanthropist who invented this kind of institution for the accommodation and relief of the labouring classes. Among the other beneficent institutions of Parma are—an hospital for incurable patients, a school of mechanical trades, a house for the poor, another for the insane, and a school for midwives, all founded by the present duchess, Maria Louisa.

The country residence of the dukes at Colorno, a few miles to the north of Parma, consists of a large mansion with extensive gardens: another villa, called Casino dei Boschi, near Sala, to the south of the capital, seems to be preferred by the present duchess as a summer residence. Selva Piana, a wood 15 miles distant from Parma, on one of the lower offsets of the Apennines, with a magnificent view, was a favourite residence of Petrarch; but the house in which he lived no longer exists.

History.—Parma was once a town of the Etruscans, and afterwards of the Boii: it was made a Roman colony at the same time as Mutina (Modena), B.C. 183. (Livy, xxxix. 55.) Martial speaks in several places of the abundance of its flocks and the fineness of their wool; and Pliny extols the salubrity of the climate. Of the antient town of Parma nothing remains except two milliary columns, which are in the little square near the church of La Steccata, a sarcophagus, and a cippus, with an inscription, in which Parma is styled 'Colonia Augusta.' (Valéry, *Voyages Littéraires*, b. viii., c. 10.) These two last monuments stand in front of the cathedral.

After the fall of the Western Empire, Parma was subject successively to the Goths, the Longobards, and the Carlovingians; it afterwards governed itself, for a time, as a republic, like its neighbours of Piacenza, Modena, Reggio, and Bologna, and it generally sided with the Guelph party and the popes. It sustained a long siege against Frederic II., who was defeated under the walls by an allied force of Bologna, Modena, and other Guelph towns. Parma afterwards was possessed in succession by the Visconti of Milan, and by Can della Scala, lord of Verona, after whose death the citizens placed themselves under the allegiance of the pope; but in 1334 the family of Correggio drove away the papal governor, and took possession of the government. It afterwards returned under the dominion of the Visconti, and then came under the Sforza, dukes of Milan. Louis XII. of France, having conquered the duchy of Milan, took Parma also; but in 1512, Pope Julius II., having driven away the French, took Parma and Piacenza, and annexed both to the papal dominions. Francis I. having conquered the duchy of Milan, Pope Leo X. gave up to him Parma and Piacenza; but Leo having afterwards joined Charles V. against the French, the latter were again driven away from Italy, and Parma and Piacenza returned to the papal allegiance. Pope Paul III., in 1545, created his son, Pier Luigi Farnese, duke of Parma and Piacenza, tributary however to the see of Rome; but the emperor Charles V., who, as duke of Milan, asserted his claims over Parma and Piacenza, refused to grant him the investiture, and the question of the sovereign dominion over Parma continued for centuries to be a subject of controversy between the House of Austria and the popes. The dukes Farnese soon found that it was their interest to be on good terms with their powerful neighbours the Austrian sovereigns of Milan, especially as the succeeding popes had no longer any tie of connection or interest with the Farnese family. Odoardo Farnese had even a serious quarrel and a kind of war with Pope Urban VIII. on account of his territories of Castro and Ronciglione. [**FARNESE.**]

In 1707, the duke Francesco Farnese having acknowledged himself a feudatory of the emperor, and as such having paid him tribute, Pope Clement XI. protested against this measure, and even issued a bull of excommunication against the Austrian troops and their commanders, who were at that time quartered in the state of Parma, which Clement qualified as a territory under the sovereignty of the see of Rome. The emperor Joseph I. replied, by a spirited declaration, that the states of Parma and Piacenza were old dependencies of the crown of Italy, and that the dukes Farnese had repeatedly acknowledged this by asking and receiving the investiture from the emperors his predecessors. (*Istoria del Dominio Temporale della Sede Apostolica nel Ducato di Parma e Piacenza*, libri iii., fol., Rome, 1720.) The whole history of the controversies between the court of Rome, the dukes Farnese, and the House of Austria, on account of Parma and its dependencies, is very curious. Botta, in his 'Storia d'Italia,' books vii., viii., ix., xxiii., xxxvi., xxxviii., and xlvii., notices these transactions at some length.

The dynasty of Farnese continued to reign at Parma and Piacenza till the extinction of the male line of that family in 1731. Elizabeth Farnese however, wife of Philip V. of Spain, claimed the duchy for her son the infant Don Carlos, to whom the last duke had bequeathed it. The pope protested; but his protest was disregarded, and Don Carlos took possession of Parma in 1732. In the subsequent war of the Austrian succession, Parma and Piacenza were taken by the Austrians, and afterwards retaken by the Spaniards in 1745. By the peace of Aix-la-Chapelle, 1748, Don Carlos having become king of the Two Sicilies, his younger brother the infante Don Philip was acknowledged as duke of Parma, Piacenza, and Guastalla. Philip, with the assistance of his minister Dutillot, administered his states with great wisdom. He died in 1765, and was succeeded by his son Don Ferdinand, during whose minority the minister Dutillot proceeded in the same system of gradual reforms, and Parma was one of the most thriving and best governed states of Italy.

At Ferdinand's accession a repetition of the usual controversy took place with the court of Rome concerning the tribute which the latter demanded as an acknowledgment of vassalage, but Dutillot resisted the claim. Then came another controversy concerning an edict of the duke, prohibiting appeals to the tribunals of Rome, and forbidding the publication of papal bulls and briefs without his own 'exequatur.' One of the best written publications on this occasion was by Professor Contini in defence of the independence of the duchy. Ferdinand, after he came of age, dismissed Dutillot, and gave himself up to the guidance of the clergy, and occupied himself much more with devotional practices than with the affairs of the administration. When Bonaparte invaded Italy in 1796, the Duke of Parma professed neutrality, which however he was made to purchase by giving up twenty of his most valuable paintings, besides two millions of francs, several thousand head of cattle, corn, and other provisions for the French army. Notwithstanding this the country was occupied by French troops, and in 18[illegible] a treaty was concluded between France and Spain, by which the state of Parma was to be given up to France at the death of the duke, and Ferdinand's son, Ludovico, was proclaimed king of Etruria, that is, Tuscany. Duke Ferdinand died in the following year, upon which Bonaparte ordered his agent Moreau de St. Méry to take possession of that state and administer it for the time. In 1805 Parma and Piacenza were definitively united with the French empire, under the name of the department of the Taro. The new king of Etruria, Ludovico, having died in 1803, his widow, Maria Luisa of Spain, administered the kingdom for her infant son Carlo Ludovico, till 1808, when they were both unceremoniously removed from Tuscany by Napoleon, and sent in a kind of banishment to France. After the fall of Napoleon in 1814, the Congress of Vienna decided that the duchy of Parma and Piacenza should be the apanage of his wife Maria Louisa of Austria during her lifetime; that the ex-queen of Etruria and her son should have the duchy of Lucca; and that after the death of Maria Louisa of Austria, the Duke of Lucca should be restored to his paternal states of Parma, and Lucca be annexed to the grand-duchy of Tuscany.

Parma is therefore at present under the government of Maria Louisa, archduchess of Austria and former empress of France. The government of this princess is generally acknowledged to be mild and adapted to secure the welfare of the people. New codes have been compiled and published. The civil code is liberal in its spirit; the penal code is rather severe, especially with regard to political offences; trials are public. There are civil and criminal courts at Parma and Piacenza, and a court of appeal in each of these towns.

The revenue amounts to about seven millions of livres, or 280,000 pounds sterling; there is a funded debt of 10,700,000 livres. The military establishment consists of about 1000 men.

The number of the secular or parochial clergy is 2470, and that of the parishes 763; the number of monks and friars is 479, and that of nuns 245. (Serristori, *Statistica d'Italia.*) The number of boys and girls who attend the elementary schools is about 9780. Twenty-five communes are still without schools.

(Valery; Neigebaur; Affò, *Storia della Città di Parma*, 4 vols. 4to., 1792; Affò, *Memorie degli Scrittori e Letterati Parmigiani*, 5 vols. 4to., continued by Pezzana; Donato, *Descrizione del Gran Teatro Farnesiano di Parma*, 4to., 1817; *Fiore della Ducale Galleria Parmense*, published by Toschi in fol.; Donato, *Nuova Descrizione della Città di Parma*, 8vo., 1824; Cortesi, *Saggi Geologici degli Stati di Parma e Piacenza*, 4to., 1819, with plates.)

PARMA, DUKE OF. [FARNESE.]

PARMACELLA. [LIMAX, vol. xiii., p. 487.]

PARME'NIDES (*Παρμενίδης*), the second in the series of the Eleatic philosophers, was a native of Elea. He was descended from a noble family, and is said to have been induced to study philosophy by Ameinias. (Diog. Laert., ix. 21.) He is also stated to have received instruction from Diochætas, the Pythagorean, to whom he erected an heroum. Later writers inform us that he heard Xenophanes, the founder of the Eleatic school, but Aristotle (*Met.*, i. 5) speaks of it with some doubt. We read that Parmenides gave a code of laws to his native city, which was so highly esteemed that at first the citizens took an oath every year to observe it. (Diog. Laert., ix. 23; Plut., *Adv. Colot.*, 32; Strabo, vi., p. 252, Casaub.)

The time when Parmenides lived has been much disputed. According to Plato (*Parmenid.*, p. 127), Parmenides, at the age of sixty-five, accompanied by Zeno, at the age of forty, visited Athens during the great Panathenæa, and stopped at the house of Pythodorus. As this visit to Athens probably occurred about B.C. 454 (Clinton, *Fast. Hell.*, p. 364), Parmenides would have been born about B.C. 519. But to this date two objections are urged; first, that Diogenes Laertius (ix. 23) says that Parmenides flourished (ἤκμαζε) in the 69th Olympiad, that is about B.C. 503; and consequently if he was born B.C. 519 he would only have been about sixteen in the 69th Olympiad; and secondly, that Socrates is stated by Plato in the dialogue entitled Parmenides, to have conversed with Parmenides and Zeno on the doctrine of ideas, which we can hardly suppose to have been the case, as Socrates at that time was only thirteen or fourteen. Athenæus (xi., p. 505) accordingly has censured Plato for saying that such a dialogue ever took place. But in reply to these objections it may be remarked, first, that little reliance can be placed upon the vague statement of such a careless writer as Diogenes; and secondly, that though the dialogue which Plato represents Socrates to have had with Parmenides and Zeno is doubtless fictitious, yet it was founded on a fact that Socrates when a boy had heard Parmenides at Athens. Plato mentions, both in the 'Theætetus' (p. 183) and the '*Sophistes*' (p. 127) that Socrates was very young (πάνυ νέος) when he heard Parmenides.

We have no other particulars respecting the life of Parmenides. He taught Empedocles and Zeno, and with the latter he lived on the most intimate terms. (*Plat., Parm.*, 127.) He is always spoken of by the ancient writers with the greatest respect. In the 'Theætetus' (p. 183) Plato compares him with Homer; and in the '*Sophistes*' (p. 237) he calls him 'the Great.' (Compare Aristot., *Met.*, i. 5.)

Parmenides wrote a poem, which is usually cited by the title 'On Nature'—*περὶ φύσεως* (Sext. Empir., *Adv. Mathem.*, vii. 111; Theophrastus, *Ap. Diog. Laert.*, viii. 55), but which may have other titles. Suidas (*Parmenid.*) calls it φυσιολογίαν, and says, on the authority of Plato, that he also wrote works in prose. The passage of Plato (*Soph.*, p. 237) however, to which Suidas refers, perhaps only means an oral exposition of his system, which interpretation is rendered more probable by the fact that Sextus Empiricus (*Adv. Mathem.*, vii. 111) and Diogenes Laertius (i. 16) expressly state that Parmenides only wrote one work. Several fragments of this work, 'On Nature,' have come down to us, principally in the writings of Sextus Empiricus and Simplicius. They were first published by Stephanus in his '*Poesis Philosophica*' (Par., 1573), and next by Fülleborn, with a translation in verse, Züllichau, 1795. Brandis, in his 'Commentationes Eleaticæ,' Hafniæ, 1813, also published the fragments of Parmenides, together with those of Xenophanes and Melissus, but the most recent and most complete edition is by Karsten, in the second volume of his 'Philosophorum Græcorum veterum, præsertim qui ante Platonem floruerunt, Operum Reliquiæ,' Brux., 1835.

The fragments of his work which have come down to us are sufficient to enable us to judge of its general method and subject. It opened with an allegory, which was intended to exhibit the soul's longing after truth. The soul is represented as drawn by steeds along an untrodden road to the residence of Justice (Δίκη), who promises to reveal everything to it. After this introduction the work is divided into two parts; the first part treats of the knowledge of truth, and the second explains the physiological system of the Eleatic school, of which an account is given under ELEATIC PHILOSOPHY.

PARME'NIO, a Macedonian general, who distinguished himself in the service of Philip, father of Alexander the Great. He gained a decisive victory over the Illyrians, about the time of Alexander's birth, and the news of both events reached Philip, who was then absent from his capital on some expedition, together with that of his having won the prize at the Olympic games. Philip, while preparing to invade the Persian empire, sent a considerable force into Asia as an advanced guard, and he chose Parmenio and Attalus as the leaders of the expedition. These commanders began by expelling the Persian garrisons from several Greek towns of Asia Minor. Parmenio took Grynium in Æolis, the inhabitants of which, having sided with the Persians, and fought against the Macedonians, were sold as slaves. When Alexander set out on his Asiatic expedition, Parmenio had one of the chief commands in the army. At the head of the Thessalian cavalry he contributed materially to the victory of the Granicus; and at Issus he had the command of the cavalry on the left wing, which was placed near the sea-coast, and had to sustain for a time the principal attack of the Persians. In the field of Gaugamela, he advised Alexander not to give battle until he had well reconnoitred the ground. Being in command of the left wing, he was attacked in flank by the Persians, and was for a time in some danger, until Alexander, who had been successful in another part of the field, came to his assistance. Parmenio afterwards pursued the fugitives, and took possession of the Persian camp, with the elephants, camels, and all the baggage. When Alexander marched beyond the Caspian gates in pursuit of Darius and Bessus, he left Parmenio, who was now advanced in years, in Media, at the head of a considerable force. Some time after, whilst Alexander was encamped at Artacoana, a conspiracy is said to have been discovered against his life. The informer was a boy of infamous character, and the persons accused were officers, though not of exalted rank. The informer said that he had first told his secret to Philotas, the son of Parmenio, who had daily access to Alexander, but who had taken no notice of it for two days, at the end of which time, through the means of another officer near Alexander's person, the information was conveyed to the king. This threw strong suspicion upon Philotas, who however was not implicated by either the informer or any of the accused in their confessions. But Craterus, who had an old jealousy against Philotas, on account of the favour the latter enjoyed with the king, encouraged the suspicions of Alexander, who recollected what Philotas had said at the time when he claimed Jupiter Ammon for his father—he pitied those who were doomed to serve a man who fancied himself a god. Craterus had also for some time previous bribed a courtesan kept by Philotas, who reported to him, and through him to the king, all the boastful vapourings and expressions of discontent uttered by Philotas in his unguarded moments. In short, Alexander, according to Curtius, was induced to order Philotas to be tortured, in consequence of the suggestions of Craterus, Hephæstion, and others of the king's companions. Cœnus, who had married the sister of Philotas, was one of the most violent against the accused, for fear, it was supposed, of being thought an abettor of his brother-in-law. The torture was administered by Craterus himself, and Philotas, after enduring dreadful agonies, confessed, though in vague terms, that he had conspired against the life of Alexander, and that his father Parmenio was cognizant of it. This being considered sufficient evidence, Philotas was stoned to death, and Alexander despatched a messenger to Media with secret orders to Cleander and other officers who were serving under Parmenio, to put their commander to death. The unsuspecting veteran, while conversing with his officers, was run through the body by Cleander. This is the substance of the account of Curtius (vi. and vii.), a compiler by no means unfavourably disposed towards Alexander.

Arrian, after stating that he derived his knowledge of these occurrences from the work of Ptolemy, briefly says that Philotas was charged by Alexander, before the assembled Macedonians, with having conspired against him: that Philotas at first succeeded in justifying himself, but that afterwards fresh evidence was produced to criminate him, and among other arguments urged against him on his trial, one of the strongest was, that having received information of a plot against the king's life, he did not reveal it, although he had access to Alexander's person twice a-day. The result of the trial was that Philotas and his accomplices were run through with spears by the Macedonians. Alexander despatched Polydamanthus to Media with letters for Cleander, Sitalces, and Menides, three officers who were serving under Parmenio. Parmenio was put to death, pursuant to the orders of Alexander: 'Whether it was,' Arrian observes, 'that Alexander thought it unlikely that Parmenio should be ignorant of the treachery of his son Philotas, or that, even if he was ignorant of it, it appeared to Alexander a dangerous thing to leave him alive after the execution of his son, especially as Parmenio's authority was so great with the troops, both Macedonian and auxiliary.' (Arrian, b. iii.)

Whatever may be thought of the trial and execution of Philotas, and it appears to have been at least a summary and unsatisfactory proceeding, the murder of Parmenio and the manner of it form one of the darkest blots in Alexander's character. Parmenio was evidently sacrificed in cold blood to what have been styled in after-ages 'reasons of state.' He was seventy years of age; he had lost two sons in the campaigns of Alexander, and Philotas was the last remaining to him. Parmenio appears to have been a steady, brave, and prudent commander.

An instance of the careless manner in which history has been often commented upon, even by writers of eminence, appears in Montesquieu (*Esprit des Lois*, x. 14), where he sums up the character of Alexander by saying that 'he committed two bad actions, burning Persepolis and killing Cleitus, but he expiated both by his repentance, so that they came to be looked upon rather as misfortunes than as crimes.' Montesquieu says nothing of the murder of Parmenio, nor of that of Callisthenes, deeds of darker guilt than those which he mentions, the former of which is doubtful, and the second has at least the excuse of being the result of a drunken brawl.

PARMIGIA'NO, FRANCESCO MAZZUOLI, sometimes called, in the diminutive form, PARMIGIANINO, was born at Parma in 1503, and was the son of Filippo Mazzuoli, called dell' Erbette. He studied painting under his uncles Michele and Filippo and his countryman Marmitta. In his sixteenth year he finished a picture of the Baptism of Christ, now in the palace of Count Sanvitati. Correggio's visit to Parma in 1521 made him acquainted with the style of that master. In 1522 he painted, among other works, a Madonna with the Child, and St. Jerome and St. Bernardin (in the convent Della Nunziata), but which has suffered from time and the hands of unskilful restorers. In hopes of giving Pope Clement VII. proofs of his skill, he went in 1523 to Rome, where the sight of the works of Raphael made a deep impression on him. In his subsequent works he endeavoured to combine with the grace of Raphael the contrasts of Michael Angelo and the grace and harmony of Correggio; whence he was called Il Raffaellino. On the taking of Rome, 1527, when he sustained considerable loss, he went to Bologna, where the engraver Fantuzzi, commonly called Antonio de Trento, stole several of his drawings, which was afterwards found in the collection of the Earl of Arundel, and brought back to Italy by Count Zanetti, who published them in 1749, admirably cut on wood and printed in colours.

Among the finest works executed by Parmigiano in Bologna were St. Rochus, painted for the church of St. Petronius, the Madonna della Rosa, now in the Dresden Gallery, which he had changed from a Venus to a Madonna, and the St. Margaret. He afterwards returned to his own country, where he painted the Cupid fashioning his bow, with two infants at his feet, one laughing, and the other crying, of which there are numerous repetitions; and began to adorn with several paintings the newly built church Della Steccata. But his health being greatly weakened, he was unable to work, and the directors of the building threw him into prison, as he had received a sum of money in advance. They indeed set him at liberty on his promise to complete the work; but indignant at this treatment, he fled to Casal Maggiore, where he died in 1540. His works, especially his easel pieces, are very scarce. The predominant features of his style are elegance of form, grace of countenance, contrast in the attitudes, perfect knowledge of the chiaroscuro, and the charm of colour. But his figures are often characterised by excessive slenderness rather than real elegance of form, and his grace sometimes degenerates into affectation and his contrasts into extravagance. His taste was exquisite, but it led him to imitate the effects rather than the principles of his masters. Parmigiano was celebrated for the care and freedom with which he designed, and for those bold strokes of the pencil which Albano calls divine. There are few altar-pieces by him: the most valued is that of St. Margaret in Bologna, a composition rich in figures, which was studied by the Carracci, and which Guido even preferred to the St. Cecilia of Raphael.

The etchings of Parmigiano are universally known as models of taste, delicacy, and freedom. He has been erroneously considered as the inventor of the art of etching, which was practised by Albert Dürer before him; but he was the first who introduced it into Italy.

PARMO'PHORUS. [CERVICOBRANCHIATA, vol. vi., p. 444 et seq.]

PARNASSOS (Παρνασσός), the name of a mountain-chain in Phocis, which extends in a north-easterly direction from the country of the Locri Ozolæ to Mount Œta, and in a south-westerly direction through the middle of Phocis till it joins Mount Helicon on the borders of Bœotia. Strabo (ix., p. 316. Casaubon) says that Parnassus divided Phocis into two parts; but the name was more usually restricted to the lofty mountain upon which Delphi was situated. According to Stephanus of Byzantium it was antiently called Larnassus, because the ark or larnax of Deucalion landed here after the flood. (Compare Ovid, *Met.*, i. 318.) Pausanias (x. 6, s. 1) derives the name from Parnassus, the son of Poseidon and Cleodora. It is called at the present day Liakura.

Parnassus is the highest mountain in central Greece. Strabo says (viii., p. 379) that it could be seen from the Acrocorinthus in Corinth, and also states (viii., p. 4[illegible]) that it was of the same height as Mount Helicon; but in the latter point he was mistaken, according to Colonel Leake, who informs us (*Travels in Northern Greece*, vol. ii., p. 527) that Liakura is some hundreds of feet higher than Paleoruna, which is the highest point of Helicon. Parnassus was covered the greatest part of the year with snow, whence the epithet of 'snowy,' so generally applied to it by the poets. (Soph., *Œd. Tyr.*, 473; Eurip., *Phœn.*, 214.) When Brennus invaded Greece, we learn from Pausanias (x. 23, s. 3, 4) that it was covered with snow.

Above Delphi there were two lofty rocks, from which the mountain is frequently called by the poets the two-headed (δικόρυφος), one of which Herodotus (viii. 39) names Hyampeia, but which were usually called Phædriades. Between these two rocks the celebrated Castalian fountain flows from the upper part of the mountain, which at present 'is clear, and forms an excellent beverage. The water which oozes from the rock was in antient times introduced into a hollow square, where it was retained for the use of the Pythia and the oracular priests. The fountain is ornamented with pendant ivy, and overshadowed by a large fig tree.' (Dodwell's *Travels*, vol. i., p. 172.) Above the spring, at the distance of 60 stadia from Delphi, was the Corycian cave, sacred to Pan and the Corycian nymphs, which Pausanias (x. 32, s. 2, 5) speaks of as superior to every other known cavern. (Compare Strabo, ix., p. 417.) When the Persians were marching against Delphi, a great part of the inhabitants took refuge in this cavern. (Herod., viii. 36.) It is described by a modern traveller (Raikes, in Walpole's *Collection*, &c., vol. i., p. 312) as 330 feet long and nearly 200 wide. As far as this cave the road from Delphi was accessible by horses and mules, but beyond it the ascent was difficult even for an active man (ἀνδρὶ εὐζώνῳ; Paus., x. 32, s. 5, 6). Above this cave, and near the summit of Parnassus, at the distance of 80 stadia from Delphi (Paus., x. 32, s. 6), was the town of Tithorea or Neon, the ruins of which are near the modern village of Velitza. For an account of the towns in the neighbourhood of the Parnassus, see PHOCIS.

PARNELL, THOMAS, was born in Dublin in 1679. He entered Trinity College, Dublin, at the age of 13, and became Master of Arts in 1700. In the same year, though under the canonical age, he was ordained a deacon, a dispensation having been granted by the bishop of Derry. About three years afterwards he took priest's orders, and in 1705 received the archdeaconry of Clogher from Dr. Ashe, the bishop of the diocese. Nearly at the same time he married Mrs. Anne Minchin, by whom he had two sons and a daughter. Parnell was on a familiar footing with the leading wits of the time of Queen Anne. On the ejection of the Whigs towards the close of her reign, he abandoned that party, to which he had been previously attached, and was cordially welcomed as an adherent by the Oxford administration. His hopes of preferment from this quarter however were disappointed by the dismissal of the Tories from office on the death of the queen. Thereafter he is represented to have fallen into intemperate habits, occasioned, it is said, chiefly by the untimely death of one of his sons, or the loss of his wife, who died in 1712. On the recommendation of Swift, he obtained a prebend from Archbishop King in 1713; and in May, 1716, was presented to the vicarage of Finglass. He died at Chester, on his way to Ireland, in July, 1717, in the 38th year of his age. A selected edition of his poems was published by Pope soon after his death, and dedicated to the earl of Oxford. A volume, said to contain his posthumous works, the authenticity of which is doubtful, appeared in Dublin in 1758. As a poet, Parnell is principally remarkable for the smoothness and ease of his versification, and the elegance and purity of his sentiments. The pieces on which his fame must rest are, the 'Rise of Woman,' the 'Fairy Tale,' the 'Hymn to Contentment,' 'Health,' the 'Vigil of Venus' (Pervigilium Veneris), the 'Night-Piece on Death,' the 'Allegory on Man,' and 'The Hermit.' Parnell was the author of the 'Life of Homer' prefixed to Pope's translation, certain papers in the 'Spectator' and 'Guardian,' and various unacknowledged performances.

(*Life*, by Goldsmith; *Poetical Works*, Glasg., 1786, fol.)

PARODY (from the Greek *παρῳδία*, and that from *ᾠδή*, an ode). A parody is a poetical pleasantry, which consists in turning what is intended as a serious composition into ridicule, by adapting it to some new purpose, or by the affected imitation of its peculiarities. It had its origin among the Greeks, from whose language the name is derived. It seems to be synonymous with the French *travestie*. Its most common form is that in which a performance, while its principal features are retained, is, by a slight change, diverted from its proper design, and made to bear a ludicrous signification. Sometimes the alteration of a single word, or even a single letter, is sufficient for the accomplishment of this. Another form of parody is that in which, without any change in the original, it receives a ludicrous character by its application to some object quite foreign to the original intention of the author. A third kind consists in choosing a mean and ridiculous subject, and treating it in the style and manner of approved writers; and a fourth, in exemplifying, in the illustration of any subject, the defects and absurdities of writers held in little esteem. Of the last two sorts of parody, more successful specimens will scarcely be found anywhere than those which occur in the work entitled 'Rejected Addresses.' The rules of parody have respect to the choice of the subject and the mode of handling it. It is necessary that the subject should be celebrated, or at least well known, and that in treating it there should be no departure from the requirements of good humour.

The term parody is also employed in music, and is given by the French writers to those pieces in which the words have been composed for the music and not the music for the words.

(*Mém. de l'Acad. des Belles-Lettres*, tom. 9.)

PAROL. This term, which signifies 'a word,' has been adopted from the Norman French as a term of art in English law, to denote verbal or oral proceedings, as distinguished from matters which have been recorded in public tribunals or otherwise reduced to writing. Thus a parol contract is an agreement by word of mouth, as opposed to a contract by deed. Parol evidence is the testimony of witnesses given orally, as opposed to records or written instruments. This is the popular acceptation of *parol*; but, strictly speaking, everything, even in writing, is parol which is not under seal.

The formal allegations of the parties to a suit in the common law courts, called pleadings, which are now made in writing, were formerly conducted orally at the bar, and in the year-books are commonly denominated the parol. Hence in certain actions brought by or against an infant, either party may suggest the fact of the infancy, and pray that the proceedings may be stayed; and where such a suggestion was complied with, the technical phrase was that the *Parol demurred* (demurrabat), that is, the pleadings were suspended until the infant had attained his full age.

PAROS, one of the larger Cyclades, is situated west of Naxos, from which it is separated by a channel five or six miles wide. Paros is estimated to be about one half the size of Naxos; it is about 36 miles in circumference. The surface is hilly, but the hills are not so high as those of Naxos: it produces corn, abundance of fruit, and has flocks of sheep and herds of swine, and plenty of partridges and other game. The population, according to Thiersch (*État de la Grèce*), is about 4000. It was hardly 2000 at the end of the last century, when Olivier visited the island. But Paros was then suffering under the infliction of a yearly visit from the captain-pasha's fleet, which anchored in the port for several weeks in the summer, in order to collect the capitation-tax from Paros and the neighbouring islands. During this time all kinds of oppression and extortion were practised by the Turks upon the defenceless and dispirited inhabitants. Tournefort, a century earlier, bore witness to the same kind of treatment. The head town of Paros, called Parichia, is on the site of the ancient town, in the inner recess of a bay on the north-west coast of the island. The principal harbour is on the north-east coast, and is the finest in the archipelago. The mountain Marpessa, now called Capresso, near the centre of the island, abounds with white marble, which was often used by the ancient sculptors. On a rock above the entrance of one of the quarries Tournefort saw a basso-rilievo representing, as he conjectured, a Bacchanalian feast, some of the figures of which were unfinished. There are four or five villages on the island, besides the capital, and several Greek monasteries scattered about.

Paros is said to have been colonised by the Cretans, and to have been at one time called Minoa, from Minos, king of Crete. It attained a great degree of prosperity by its maritime trade, and the chief town was wealthy and well fortified. When Darius invaded Greece, the inhabitants of Paros submitted to the Persians, and furnished sailors for the Persian fleet, in consequence of which, after the battle of Marathon, Miltiades went with an Athenian squadron to attack the island; but he failed in the attempt, and received the wound of which he shortly after died. [MILTIADES.] After the defeat of Xerxes at Salamis, Themistocles obliged Paros to pay tribute to Athens. The island afterwards underwent the same vicissitudes as the rest of the Cyclades, until it fell at last under the dominion of the Romans. Paros is mentioned in the inscription of Adule among the countries subject at one time to the Ptolemies of Egypt. When the Franks took possession of Constantinople, Paros, like most of the Cyclades, became subject to the Venetians. It formed for a time part of the dukedom of Naxos, but afterwards became a separate principality of the Venetian family of Veniero, under which it remained till Barbarossa took it in the sixteenth century. During the war of Candia in the following century, the Venetians landed at Paros; but soon after abandoned it, after destroying the olive plantation, the principal wealth of the island. In the latter part of the eighteenth century, the Russians took possession of Paros, and made it for a time the station of their fleet. It now belongs to the kingdom of Greece.

The Greek inscription called the 'PARIAN CHRONICLE' was found in this island.

West of Paros, and separated from it by a narrow channel, is the smaller island called Antiparos, formerly Olearos. The island produces some corn, and contains a village which is inhabited by a few hundred people. Antiparos is noted for its natural cave or grotto, one of the largest and finest that is known. It is described by Tournefort in his 'Travels,' who gives a print of the interior

Coin of Parus.
British Museum. Actual size.

PARO'TIA. [Bird of Paradise, vol. iv., p. 420.]

PAROTID GLAND (from παρά, 'near,' and οὖς, 'the ear') is the largest of the three principal glands by which the saliva is secreted and poured into the mouth. The parotid glands are situated, one on each side of the face, behind the ascending part of the lower jaw, and below and in front of the ear. The most anterior portion of each lies upon a part of the masseter muscle, immediately beneath the skin of the face, at the most backward part of the cheek; and hence the main duct passes forwards, penetrating obliquely through the fat of the cheek and through the buccinator muscle, to open into the cavity of the mouth nearly opposite to the second molar tooth of the upper jaw. The more posterior part of the gland is placed in an intricate manner among the tissues behind the jaw and beneath the outer part of the base of the skull, fitting into the irregularities that are left between them, and in some parts passing very deeply down beneath the skin.

The structure of the parotid, like that of all the glands secreting saliva, is lobulated, being made up of a number of minute cells, the terminations of the branches of the main duct, upon whose walls a net-work of capillary blood-vessels is arranged, and which are collected together in uncertain numbers to form the several lobules of which the whole gland is made up. [Digestion.]

The principal disease to which the parotid gland is subject is the mumps. [Mumps.] It is often attacked with inflammation and suppuration in the course of severe fevers, and is liable to be affected by the different kinds of malignant growths, as cancer, fungus hæmatodes, &c. In these cases the whole or the affected part of the gland has sometimes been removed with success, but the operation must be considered one of the most dangerous and uncertain in surgery. Wounds of the parotid duct, which, from its exposed situation, are not rare, often lead to the formation of salivary fistulæ, the constant flowing of saliva through the aperture preventing the complete healing of the skin, and thus establishing a permanent opening on the exterior of the cheek, through which the saliva flows. To prevent this evil, the sides of any wound in which it is suspected that the parotid duct is divided, should be brought together with peculiar care, and held in exact apposition by gentle compression: for its cure, when the fistulous opening is formed, an operation is generally necessary, which consists in perforating the interior of the cheek from the outer opening, and then endeavouring, by compression of the latter, to turn the course of the saliva inwards, and restore the natural passage into the mouth.

PARR, CATHERINE. [Henry VIII.]

PARR, SAMUEL, was born at Harrow-on-the-Hill, 1747, where his father was a surgeon and apothecary. He was early distinguished for his love of books and his aptitude at learning. He received his education at the grammar-school of Harrow, and gave the highest satisfaction to the masters under whom he was placed, and who predicted his future eminence. In his fifteenth year he was removed from school and put to the business of his father. But the progress he had made in classical literature, and the intellectual habits he had formed, enabled him to continue his studies with the greatest advantage and success. Being disgusted with the employment selected for him, and having early displayed a grave and serious disposition, a predilection for the clerical profession, and an attachment to ecclesiastical pomp and circumstance, it was at length determined to send him to the university. Accordingly, in 1765, in his nineteenth year, he was entered at Emanuel College, Cambridge, where he applied himself with great diligence to classical and philological pursuits. But his father dying soon after, he was compelled, before he had taken a degree, to relinquish his academic career, where so bright a prospect was opening upon him, and in 1767 became one of the assistants in Harrow School. In this situation he remained five years, with the greatest credit to himself: and on the death of Dr. Sumner, offered himself as a candidate for the vacant mastership, but without success. His youth was the ostensible, while in all probability his politics were the real objection against him in the mind of the governors. With bitterness of spirit he now left the place of his birth and the scenes of his boyhood, and kept a school successively at Stanmore, at Colchester, and at Norwich. In 1786 he settled at Hatton, in Warwickshire, to the small living of which place he had been presented; and here he spent the remainder of his life, in discharging the duties of his parish, in the instruction of youth, and in accumulating those stores of philological learning for which he became so eminently distinguished. The highest preferment he obtained in the church was a prebendal stall in St. Paul's The Whigs, to whom he had attached himself, had few opportunities of disposing of the patronage of the state; and when the occasion offered, Lord Grenville, with a base and cool ingratitude, urged against him, who had so long and so faithfully served his party, his unpopularity with the members of his profession. In fact, while he served his party, he did not attach or fix himself upon the individuals of his party.

Parr was a man of great talents, of very extensive learning, and of pre-eminent conversational powers; but he was vain, arrogant, and overbearing. His friends uniformly represent him as possessing much benevolence and kindliness of feeling; but he required the most abject submission, and exacted the most slavish attention from all who approached him, or he never hesitated about insulting and making himself exquisitely offensive to them. Neither can some of his acts be altogether reconciled with the character of generosity ascribed to him. He printed an edition of Bellendenus [Bellendenus], with a preface, in which he eulogised the eloquence and ability of the *tria lumina Anglorum*, Lord North, Fox, and Burke; but he seems to have undertaken the task rather for the sake of bearding his political foes than passing an encomium upon his political friends. He re-published 'Tracts by Warburton and a Warburtonian,' to annoy Bishop Hurd, the editor of Warburton; and felt no compunction about injuring the fame of the latter, whom he pretended to admire and respect, if he could only quarrel with the former, who had given him no offence save what an inordinate and morbid self-conceit might imagine. In his literary and political disputes he argued and declaimed with the fierceness of party-feeling and the petulance of self-love, and forgot alike both the equities and the decencies of controversy. Though of unquestioned ability, he spoke and wrote with the fluency of ready knowledge, rather than with the profoundness of original thought or the compass of a philosophic spirit. He was a determined and violent Whig, but he had no right views, no just sentiments, with respect to freedom; as his opinions on the slave trade and Test Act questions fully testify. It must be stated however that on these subjects his mind underwent a change in the latter part of his life. Still his notions about civil and religious liberty were never the clearest or the most comprehensive, for while he could recommend conciliation to the Catholics and the Unitarians, he did not hesitate to suggest persecution against the Methodists.

He left a vast mass of papers behind him, consisting of his correspondence, and of historical, critical, and metaphysical disquisition. His published writings, by Dr. Johnstone, fill eight thick 8vo. volumes. They are distinguished by copious erudition, a ready conception, and a vigorous and ample style But he has left no great work; nor will his name go down to posterity associated with any important principle or extensive literary undertaking. His fame rests upon a learning which, whatever may have been its accuracy and its extent, has bequeathed to the world no memorable results, and upon a colloquial power which, with the exception of Dr. Johnson, left him without a rival. He died in 1825, in the 79th year of his age, and was buried at Hatton.

PARRA. [Rallidæ.]

PARRAL. [Mexican States.]

PARRHA'SIUS, son and pupil of Evenor, was a native of Ephesus, but became a citizen of Athens. He raised the art of painting to perfection in all that regarded the essential. He compared his three great predecessors with one another, rejected that which was exceptionable, and adopted that which was admirable in each. The classic invention of Polygnotus, the magic tone of Apollodorus, and the exquisite design of Zeuxis, were all united in the works of Parrhasius; what they had produced in practice he reduced to theory. He so circumscribed and defined, says Quintilian (*Inst. Or.*, xii. 10), all the powers and objects of art, that he was termed the Legislator; and all contemporary and subsequent artists adopted his standard of divine and heroic proportions.

Parrhasius himself was aware of his ability: he assumed the epithet of the Elegant (Ἁβροδίαιτος), and styled himself Prince of Painters; he wrote an epigram upon himself (Athenæus, xii. p. 543, Casaub.), in which he proclaimed his birth-place, celebrated his father, and pretended that in himself the art of painting had attained perfection. He also declared himself to be descended from Apollo, and carried his arrogance so far as to substitute his own portrait in a temple as Mercury, and thus receive the adoration of the multitude. (Themist., xxi.) He wore a purple robe and a golden garland; he carried a staff wound round with tendrils of gold, and his sandals were bound with golden straps. (Ælian, *Var. Hist.*, ix. 11.) It appears then that Pliny justly terms him the most insolent and most arrogant of artists. (*Hist. Nat.*, xxxv. 10, 36.)

The branch of art in which Parrhasius eminently excelled was a beautiful outline as well in form as execution, particularly in the extremities, for, says Pliny, when compared with himself, the intermediate parts were inferior.

One of the most celebrated works of Parrhasius was his allegorical figure of the Athenian people, or Demos. Pliny says that it represented, and expressed equally, all the good and bad qualities of the Athenians at the same time; one might trace the changeable, the irritable, the kind, the unjust, the forgiving, the vain-glorious, the proud, the humble, the fierce, and the timid. How all these contrasting and counteracting qualities could have been represented at the same time, it is difficult to conceive; if we are to suppose it to have been a single figure, it is very certain that it could not have been such as Pliny has described it (xxxv. 10.36), for, except by symbols, it is totally incompatible with the means of art.

Parrhasius painted a Theseus, which, after the general spoliation of Greece, was placed in the Capitol at Rome. It was probably for this picture that he was made a citizen of Athens. When Euphranor remarked that the Theseus of Parrhasius had fed upon roses, and his own upon beef, he seems to have alluded particularly to the style of design, and not, as one might suppose, to the colour; for, as Winckelmann has observed, the word used by Plutarch (γλαφυρῶς, 'elegantly') relates expressly to form. (*De Glor. Ath.*, 2.) According to the taste of Euphranor, the figure of Parrhasius was too elegant, too delicate, too effeminate for heroic beauty.

Pliny enumerates many other works by Parrhasius; a naval commander in his armour; a Meleager, Hercules, and Perseus upon the same tablet; Ulysses feigning insanity; Castor and Pollux; Bacchus and Virtue; a Cretan nurse with an infant in her arms; a priest officiating, with an attendant youth bearing incense; two youthful boys, in whom were admirably depicted the innocent simplicity of their age, and its happy security from all care; a Philiscus; a Telephus; an Achilles; an Agamemnon; an Æneas; and two famous pictures of Hoplites, or heavy-armed warriors, one in action, the other in repose, admirably painted.

Parrhasius amused himself also with painting small libidinous pieces. The Archigallus mentioned by Pliny was most probably of this description, both from the particular favour of Tiberius with which it was honoured, and the peculiar nature of the rites of Cybele, whose chief priest was the Archigallus. To this class we may add the picture of Meleager and Atalanta, mentioned by Suetonius (*Tib.*, c. 44): this picture was bequeathed to Tiberius on the conditions that if he should be offended with the subject, he should receive in its stead 1,000,000 sesterces ('decies H-S,' about 8000*l.*). The emperor not only preferred the picture to the money, but had it fixed up in his own chamber, where the Archigallus was also preserved, and which was valued at [illegible] (about 530*l.*). These productions entitle Parrhasius to the epithet of Pornographus, and prove that this style of painting was in fashion long before the [illegible] of Tiberius.

Plutarch instances Parrhasius's picture of Ulysses feigning insanity as an improper subject for the pencil, yet commended to our taste through the spirit of the conception and the truth of the execution. (*De Aud. Poet.*)

Parrhasius painted a Hercules, which he affirmed was a facsimile of the god as he had frequently appeared to him in his dreams. (Athenæus, xii. 543.) He painted also a Philoctetes. (*Anthol. Gr.*, iv. 8, 23.) Pliny mentions a contest between Parrhasius and Timanthes of Cythnus, in which the former was beaten: the subject of the picture was the contest of Ulysses and Ajax. The proud painter, indignant at the decision of the judges, is said to have remarked, that the unfortunate son of Telamon was for a second time, in the same cause, defeated by an unworthy rival. (Athen., xii. 543.)

Pliny records also a trial of skill between Parrhasius and Zeuxis, in which the latter allowed his grapes to have been surpassed by the drapery of the former: this contest, says Fuseli, 'if not a fable, was an effort of puerile dexterity.'

The story told by Seneca of Parrhasius having crucified an old Olynthian captive when about to paint a Prometheus chained, that he might see from nature the true expression of bodily agony, cannot relate to this Parrhasius, and is probably a fiction: it is nowhere to be found but in the 'Controversiæ' (v. 10) of the preceptor of Nero. Olynthus was taken by Philip in the second year of the 108th Olympiad, or B.C. 347, which is nearly half a century later than the latest accounts we have of Parrhasius. Socrates died in the 95th Olympiad, and Parrhasius must therefore have been already celebrated before that time, from his dialogue with that philosopher upon the principles of art as preserved by Xenophon. (*Mem.*, iii. 10.) He is even mentioned by Pausanias (i. 28) in the 84th Olympiad, when he is said to have painted a battle of the Lapithæ and Centaurs on the shield of the Minerva of Phidias at Athens: supposing such to be the case (for although improbable, it is still not impossible), Parrhasius, if living, must have been at least 120 years of age when Philip took Olynthus. A similar story is told of Giotto, with probably as much truth; and some have also said the same of Michael Angelo Buonarotti.

PARROT. [PSITTACIDÆ.]

PARSEES. [PERSIA.]

PARSLEY. The garden parsley (*Petroselinum sativum*) is a hardy biennial, a native of Sardinia, introduced into this country about the middle of the sixteenth century. There are three varieties, two of which are well known, and commonly used as pot-herbs, and for garnishing, namely: the common or *plain-leaved*; the *curled*; and the *Hamburg, large* or *carrot-rooted*, which last is cultivated only for its roots, occasionally used as young carrots. The curled variety is by far the most useful, and from its beautiful curled foliage it cannot be mistaken for the *Æthusa Cynapium*, or fool's parsley, a poisonous plant somewhat resembling the plain-leaved parsley. [ÆTHUSA.]

The cultivation is simply that of sowing, usually in spring, in shallow drills about a foot apart; or in single rows along the borders of a kitchen-garden. The Hamburg requires to be sown in tolerably light soil, such as would suit the carrot, like which it requires in all respects to be treated.

PARSNIP. The cultivated parsnip (*Pastinaca sativa*) is a native of England, and ranks amongst the hardiest of kitchen-garden productions, as is proved by the fact of its having withstood the intense frost of 1838, in the open ground. There are four varieties, namely, the *Common*, *Guernsey*, *Hollow-crowned*, and *Round* or *Turnip-rooted*. The Hollow-crowned has been found the best. The mode of culture is very simple. The soil ought to be deep and rather light, but by no means adhesive; and it should be trenched to the depth of at least two feet. In order that the roots may be clean and sound, fresh manure should not be applied; indeed if the soil be in tolerably good condition, no manure is required; and on the contrary, if it be poor, a more liberal supply should be given in the previous season, so that any immediate application along with the parsnip crop is not requisite.

The seed should be sown in March, and as early in that month as the weather and state of the soil will permit, in shallow drills eighteen inches apart, the plants being afterwards thinned to about a foot asunder in the rows. The roots are not in perfection for culinary purposes till their first season's growth is completed, which is indicated by the decay of the greater part of the leaves.

Some may be then taken up, their tops cut off, but not [illegible] closely, and the roots stored in sand in a cool place, so as to guard against the stimuli of light and heat as much as possible. This precaution of storing in the early part of winter is only necessary in case of frost becoming so severe as to render the operation of removal difficult: but the whole of the crop should be taken out of the ground before vegetation recommences in the spring, and treated as above.

Besides the use of the roots for the kitchen, a wine is sometimes prepared from them. Abounding in saccharine matter, they afford by distillation an ardent spirit, the process of fermentation being facilitated by the addition of a small portion of malt liquor.

PARSON. [Benefice, p. 219.]

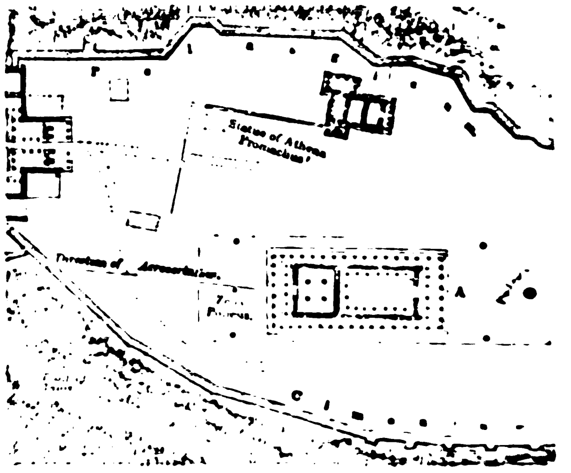
PARTHENAY. [Sevres.]

PARTHE'NIUS, the antient name of the Bartan or Bartin. This river rises in Mount Olgassys, which is a continuation of the mountain-chain which runs from Mysia towards Armenia, and is known by the names of Ida, Olympus, &c. It flows in a north-westerly direction into the Euxine, and separates Bithynia and Paphlagonia. The country through which it flows is very fertile and beautiful. (Strabo, xii. 543; Tournefort, vol. ii., p. 88.) Ovid (*Ex Ponto*, iv. 10, l. 49) and Ammianus Marcellinus (xxii. 8) speak of the Parthenius as a rapid stream; and Xenophon (*Anab.*, v. 6, s. 9) says that it is impassable. It is mentioned in the Iliad (ii. 854).

The etymology of the name is differently explained. The Greek writers connect it with the Greek word *parthenos*, 'a virgin,' and for the most part suppose that it derived its name from Artemis being accustomed to bathe in its waters. (Apoll., *Argon.*, ii. 938.) Strabo (xii., p. 543) supposes that it was so called on account of the fertile country through which it flows; but the name was probably a native word, and had no connection with the Greek *parthenos*, except an accidental similarity of sound. Some modern writers imagine that it may be connected with the Hebrew-Phœnician *phorath*, which means fruitful. The antient name is still preserved by the Greeks, who call it Bartin, or Bartan, but it is called Dolap by the Turks.

PAR'THENON (Παρθενών), the temple of the virgin goddess Athene, or Minerva, the protectress of Athens, is situated on the Acropolis of that city. This edifice was erected in the time of Pericles (about B.C. 448). The architects were Callicrates and Ictinus, and the sculptures were executed by Phidias and his assistants. This temple has always been considered the most refined example of the Grecian Doric style, and one of the noblest monuments of antiquity. Yet its grandeur was by no means owing to its extraordinary dimensions, since in point of size it falls very short of many other structures, modern* as well as antient, its extreme length being only 228 feet, and its breadth 100, and the interior of the cella only 145 ft. 6 in. by 63 ft. 6 in., which is little more as to length than the size of the Elgin Hall in the British Museum, viz. 143 by 46 feet. Technically described, this temple was peripteral octastyle, that is, it had columns along its sides and at both ends, viz. eight beneath each pediment, making in all 46 columns, there being, including those at the angles, 17 on each side, or 16 intercolumns. Besides these external columns, there was likewise a range of inner columns at each end, forming the pronaos and opisthodomus, namely six, not however placed *in antis*, as usually, but the extreme columns in front of the antæ extending from the walls of the cella. The cella itself was hypæthral, that is, the central space between the columns along each side was open to the sky. This portion of the structure however was so shattered by an explosion in 16[illegible], when it was used as a powder-magazine by the Turks, at the time of the city being besieged by the Venetians, that its original design is now altogether matter of conjecture; besides which, the interior of the temple had been more or less injured by having been converted first into a Christian church, and afterwards into a Turkish mosque. Still, even in its present shattered and mangled state, it is the admiration of all travellers and artists who have beheld it, and some of whom have spoken of it in terms of enthusiasm that appear quite exaggerated. It is said that what now remains of it far exceeds any idea that can be derived from descriptions or drawings, and that it appears to be upon a much larger scale than it really is. In its original state indeed the effect must have been exceedingly impressive and fine; taking the building by itself, without reference to advantages of site, locality, climate, &c., it was distinguished by beauty of material, exquisiteness of execution, and grandeur of style; while to these architectural merits must be added the extraordinarily rich display of sculpture in the pediments, the metopes, and the frieze along the exterior of the cella, and also the decoration of painting [Polychromy], and of bronze ornaments. The chief portion of the sculpture of the edifice was removed by Lord Elgin. [Elgin Marbles.] This circumstance called forth at the time severe animadversion, though it is now well known that there was imminent danger of those relics of art being utterly destroyed by the wanton barbarism of the Turks and others. One object of art that originally decorated the interior or shrine was the chryselephantine statue of Minerva, 39 feet high, which was the work of Phidias. This figure was ornamented with gold, to the amount of 40 talents according to Thucydides, but according to Philochorus, 44 talents, or about 120,000l. sterling; of which however it was stripped by Lachares, somewhat more than a century and a quarter after the death of Pericles.

The Parthenon.



Plan of a portion of the Acropolis. A, the Parthenon.

Since the establishment of King Otho's government, 1833, excavations have been made on the Acropolis and around the Parthenon, and a great number of fragments of sculpture and architecture have been brought to light. Some of the fallen columns have also been replaced, and measures taken to restore the structure as far as circumstances will permit. For particulars as to the order and dimensions, see Column, page 3[illegible]5, and table, page 3[illegible]7.

In 1823, an edifice was begun on the Calton Hill, Edinburgh, which was, externally at least, to have been an exact model of the Parthenon, but after fourteen columns were put up, it was discontinued, nor is there any prospect of its being ever completed.

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* For the dimensions of the Madeleine, which is externally a peripteral Greek temple, see Paris, page 287.

PARTHENOPE (Zoology). [PARTHENOPIANS.]

PARTHENO'PIANS. This tribe, in the arrangement of M. Milne Edwards, corresponds nearly to the genus *Parthenope* as established by Fabricius; but the species are separated by M. Edwards into the genera *Eumedonus, Eurynome, Lambrus, Parthenope,* and *Cryptopodia,* forming a natural group which, in the opinion of the last-named zoologist, establishes the passage between the *Maians* [MAIIDÆ] and the *Cyclometopes.*

Characters of the Tribe.—Carapace ordinarily triangular and hardly longer than it is wide; its latero-posterior borders in general nearly transverse, and the latero-anterior borders following the same direction as the edges of the rostrum; but the lateral spaces of the carapace are sometimes rounded, and its surface is nearly always lumpy and tuberculous. *Rostrum* in general small and entire, or only notched at the end; the *eyes* are nearly always perfectly retractile; the basilary joint of the *external antennæ* sometimes presents the same disposition as in the *Maians,* but in the great majority of cases it is quite otherwise; it is short, and is not joined to the neighbouring parts of the shell; its internal border does not concur to form the lower orbital wall, and its extremity does not reach to the front; the moveable stem of these antennæ is short, and takes its origin in a gap of the internal orbital angle. The *epistome* is much wider than it is long, and the form of the *external jaw-feet* is nearly the same as in the *Maians.* The anterior *feet* are very much developed, and widen so as nearly to make a right angle with the body; in the male they are always more than twice as long as the post-frontal portion of the carapace, and sometimes four times as long; the hand is nearly always triangular, and the claw suddenly curved downwards, so that its axis forms a very marked angle with that of the hand. The succeeding feet are, on the contrary, short; the second pair in general are less than once and a half of the length of the post-frontal portion of the carapace, and the others progressively diminish. The *abdomen* in the male presents considerable differences in the number of distinct joints, whilst in the female there are always seven.

Geographical Distribution.—The tribe is widely distributed, and species are found in the English Channel, the Mediterranean Sea, and the Indian Ocean.

Place in the System.—The Parthenopians are placed by M. Milne Edwards between the *Maians* and the *Cyclometopes.*

Eumedonus. (Edwards.)

This genus, in the opinion of the last-named author, establishes in some sort the passage between the *Stenorhynchi* and the *Achæi* on one side, and *Eurynome, Lambrus,* and *Parthenope,* on the other.

Generic Character.—Carapace nearly pentagonal, as in *Parthenope,* but it scarcely ever goes beyond the level of the third pair of feet. *Body* depressed; *rostrum* very wide and very much advanced, and divided at its extremity only; *eyes* very short, their peduncle entirely filling the orbits, which are circular, a character which again approximates this genus to the Stenorhynchi; internal *antennæ* bent back very obliquely outwards; external antennæ but little developed; their first joint does not distinctly concur in the formation of the lower wall of the orbit; their moveable stem arises in the slit which the two internal angles of that cavity leave between them nearly as in the Parthenopes, and their terminal joint is very short. The *epistome* is shorter than in most of the *Oxyrhynchi.* The *external jaw-feet* present nothing remarkable. In the male the first pair of thoracic feet are stout and much longer than the succeeding ones; all these last are a little compressed; and their third joint is surmounted by a crest which is not distinctly visible on their other joints. The second pair of feet are rather shorter than the third and fifth, which are nearly as long as the fourth; instead of being placed on the same level, they are inserted above so as partially to cover them. The *abdomen* of the male is composed of seven joints, the two first of which are visible on the dorsal surface of the body. Abdomen of the female unknown to M. Edwards.

Example, *Eumedonus niger.*

Description.—This small and only known species is remarkable for the great prolongation on each side of the carapace: these points are directed outwards, and their base occupies the whole of the hepatic region. There are some depressions on the upper surface of the carapace, which is, like all the rest of the body, covered by small miliary granulations. The rostrum is very wide, flat, slightly notched at the end, and about one-third of the length of the entire carapace. The anterior feet are armed with a strong spine which occupies the lower border of the carpus, and two small points placed on the upper border of the hand, which is slightly tumid. The pincers are armed with some rounded teeth, and are not sensibly curved inwards. The other feet are slightly hairy. Colour brownish black.

Locality.—Coasts of China.

Eumedonus niger.

Eurynome. (Leach.)

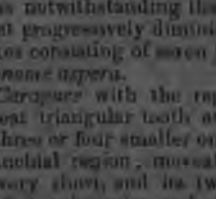
This genus, in the opinion of M. Edwards, establishes the passage between the *Lambri* and the other Oxyrhynchi. The general form of the body and its aspect approximate these crustaceans to *Parthenope,* whilst the disposition of their external antennæ is similar to what is seen in *Maia.*

Generic Character.—Carapace nearly triangular, with a rounded base, very much embossed and covered with asperities. *Rostrum* horizontal and divided into two triangular horns. *Eyes* small; *orbits* deep, their upper border very projecting and separated from the external angle by a slit. The internal *antennæ* bent back longitudinally; the first joint of the external ones terminating at the internal angle of the orbit and supporting the succeeding joint at the upper edge of its extremity, so that the moveable stem of these antennæ, which is prolonged under the *rostrum,* appears to spring from the internal canthus of the eyes. *Epistome* nearly square, and third joint of the *external jaw-feet* much dilated outwards. *Sternal plastron* nearly oval, and its median suture occupying the two last thoracic rings. First pair of feet hardly larger than the succeeding ones, rather long in the male, whilst in the female they are very short, but less notwithstanding than the second pair; the succeeding feet progressively diminish in length. *Abdomen* in both sexes consisting of seven joints.

Example, *Eurynome aspera.*

Description.—Carapace with the regions very distinct, rugose, with a great triangular tooth at the external angle of the orbit, and three or four smaller ones along the lateral border on the branchial region; moveable stem of the external antennæ very short, and its two first joints very small. Anterior feet tuberculous and slightly compressed, nearly straight in the female and with the pincer curved inwards in the male; succeeding feet rugose, and furnished with a crest, which is most marked on the third joint. Length about half an inch. Colour rosy, with bluish tints.

Locality.—The coasts of Noirmoutier and of the British Channel, at rather considerable depths.



Eurynome aspera.

M. Milne Edwards refers to the *Eurynome (Lissa) verrucosa* (?) of M. Risso, from the Mediterranean, as having much in common with the species above noticed; but the details are not, in his opinion, sufficient to enable us either to refer it with certainty to this genus or to distinguish it from *Eurynome rugosa.*

Lambrus. (Leach.)

Carapace nearly as long as it is wide, rounded on the sides and narrowed forwards; branchial regions very much developed, tumid, and separated from the median portion of the carapace by a deep furrow; stomachal region, on the contrary, very narrow; upper surface of the edge of the shell always more or less tuberculous or spiny. *Rostrum* small but rather advanced. *Eyes* perfectly retractile and orbits nearly circular, the walls of these cavities presenting a fissure above and a wide and deep gap below the internal canthus of the eye. The *internal antennæ* bend back obliquely, and the fossets which lodge them are in general continuous with the orbits, for the space which separates the internal angle of the lower orbital border from the front is far from being filled by the peduncle of the *external antennæ*, whose first joint is extremely small and scarcely longer than it is wide; the second is more elongated, but never reaches to the front, and advances between the basilary joint of the internal antennæ and the internal border of the lower wall of the orbit; the third joint has its origin in the gap which occupies the internal angle of this cavity; and the fourth or terminal filament is very short. The *epistome* is but little developed and much wider than it is long; the pterygostomian regions are small and nearly triangular. The external *jaw-feet* present nothing remarkable. The *sternal plastron* is much longer than it is wide. The first pair of feet are at least twice and a half as long as the post-frontal portion of the carapace, and often are twice that length; they extend to the right angle of each side of the body, do not differ sensibly from each other, and are always more or less triangular; the claw which terminates them is small and suddenly curved downwards and inwards, so as to form an angle with the rest of the hand. The succeeding feet are short and slender; their length diminishes progressively, and the second pair are never more than half as long as the first. The *abdomen* of the female presents nothing remarkable, but sometimes there are six instead of seven joints: in the male, the third, fourth, and fifth rings are more or less intimately blended, so that this part of the body is only composed of five distinct joints, and sometimes there are but four.

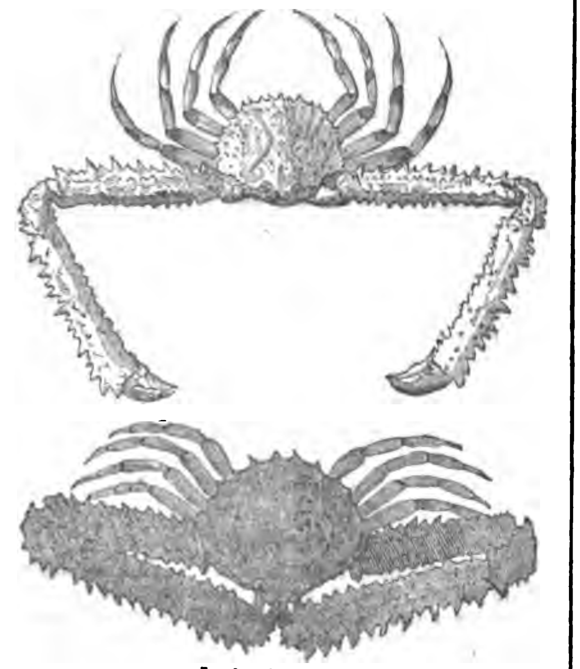
Geographical Distribution of the Genus.—The Mediterranean Sea and Indian Ocean, where the species live among the rocks at considerable depths.

§ A. Carapace nearly as long as it is wide.

a. Carapace rugose, covered above with spines or tubercles.

*a.** Four first pair of feet having the third joint armed with spines.

Example, *Lambrus longimanus.*



Lambrus longimauus.

Description.—Rostrum extremely small, scarcely projecting, horizontal, and formed of three teeth. Carapace nearly ular, furnished above with simple spines and tubercles; al edges armed with very long and slightly ramose s; hands triangular, nearly smooth on the upper sur- rough with branched spines on the upper border, and with large pointed teeth, and dentilated edges on the external border. There are some very short spines on the upper and lower borders of the third joint of the four last pair of feet. Length about one inch.

Locality.—Pondicherry, Amboyna, &c.

*a.*** Four last pair of feet without spines.

Example, *Lambrus angulifrons.* Length nearly an inch.

Locality.—Gulf of Naples and coasts of Sicily.

a.a. Carapace nearly quite smooth above.

Example, *Lambrus Messana.* Length about an inch. Colour red-brown.

Locality.—The volcanic rocks of the coasts of Sicily.

§ B. Carapace much wider than it is long.

b. Upper surface of the hands rough with spines, which are more or less ramose, and having their upper and internal borders armed with spines like each other, and neither compressed nor united into a crest.

Example, *Lambrus echinatus.* Body covered with a brown down. Length about 18 lines.

Locality.—The coast of Pondicherry.

b.b. Upper surface of the hands more or less smooth, and never with ramose spines; their upper and external borders armed with teeth, which are compressed, and so disposed as to form a crest.

Example, *Lambrus serratus.* Length nearly an inch.

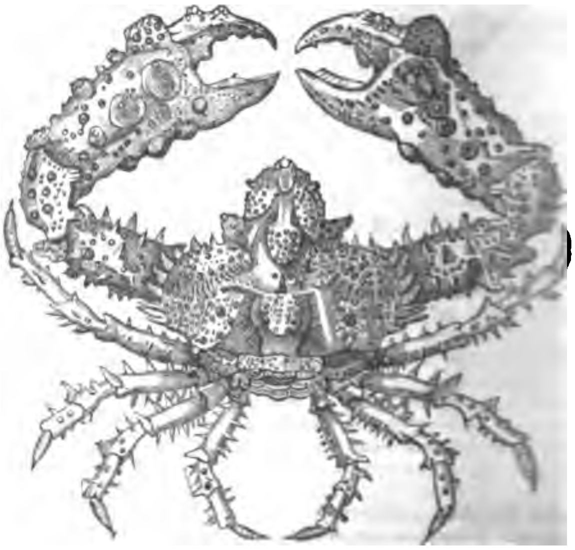
Locality.—Indian Ocean.

Parthenope.

This genus, as limited by modern authors, consists but of one species, distinguished principally by the disposition of the *external antennæ*, whose basilary joint is not soldered to the neighbouring parts, but nearly reaches the front, and whose second joint, more than half as short as the first, is lodged in the gap of the lower orbital angle; the smallness of this gap, which makes the orbit communicate with the antennary fosset; the regularly triangular form of the *carapace;* and the existence of seven distinct joints in the abdomen of both sexes.

Example, *Parthenope horrida.* Carapace pentagonal, wider than it is long, horizontal, strongly embossed, and tuberculous above; rostrum short, triangular, and armed below with a strong interantennary tooth; orbits circular, with a fissure on the upper border; latero-anterior borders of the carapace very oblique, and armed with spines; anterior feet very large, of unequal size, and covered with large spiniferous tubercles; claws less compressed and less inflected than in *Lambrus.* The four succeeding pair of feet armed to the origin of the tarsus with sharp and very large spines, forming one row above and two below.

Locality.—Indian and Atlantic oceans.



Parthenope horrida.

Cryptopodia. (Edwards.)

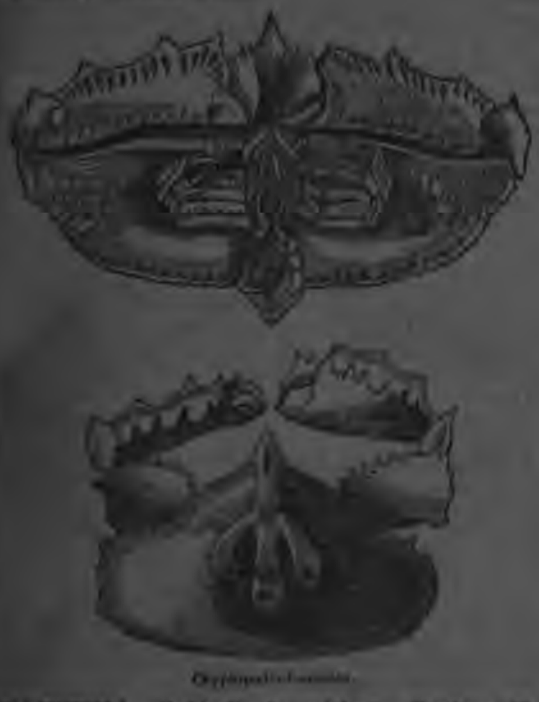
M. Milne Edwards is of opinion that this singular genus establishes in some respects the passage from *Lambrus* to *Œthra* [Œthra]; and, in fact, he observes, the form of its feet is the same as in the first; while the carapace presents, as in the last, lateral expansions which extend above [illegible] and hide them. Edwards therefore placed *Cryptopodia* among his *Parthenopes*, Lamarck among the *Æthræ*, and Bosc both among the *Calappæ* and *Maiæ*.

Generic Character.—*Carapace* slightly tumid, and in the form of a triangle, which is very wide, very short, and rounded at the base; it is nearly twice as wide as it is long, but this great width does not depend on that of the body itself, but is due to the existence of the lamellar prolongation which surrounds the three posterior fourths of the dorsal buckler (shield). This prolongation extends very far beyond the insertion of the abdomen; but it is especially considerable on the lateral parts, for there it forms an enormous vault on each side, which completely hides the four last pairs of feet. *Front* triangular, horizontal, and rather advanced. *Eyes* very small and completely retractile. *Internal antennæ* like those of *Æthra*; their first joint quadrilateral and flat; the second rather longer, and reaching to the front; the third lodged nearly entirely in the slit which exists between the front and the internal angle of the lower orbital border; the terminal stem which thus springs from the internal canthus of the eyes is very short. *Epistome* rather wider than it is long; the second joint of the *external jaw-feet* terminating anteriorly by a nearly straight border; and the third, which is square, presenting forwards a notch which occupies its internal border rather than its internal and anterior angle, and which gives insertion to the succeeding joint. *Sternal plastron* much longer than it is wide. *First pair of feet* very large and nearly prismatic; their direction and form nearly the same as in *Lambrus*. Four last pairs very small, and nearly of the same length; they scarcely reach beyond the vault which covers them. The *abdomen* in the female consists of seven joints.

Example, *Cryptopodia fornicata*.

Description.—Carapace smooth above and denticulated on the borders; rostrum entire, as long as it is wide; anterior feet about once and a half as long as the carapace; their third joint very much dilated posteriorly, and armed with spines on the anterior border. Four last pairs of feet furnished above and below with a denticulated crest for nearly the whole length of their third joint.

Locality.—Indian Ocean.



Cryptopodia fornicata.

PARTHIA, called by Strabo and Arrian, Parthyæa (Παρθυαία). This term originally comprised a small and mountainous country (Strabo, xi., p. 514) south-east of the Caspian sea, between Hyrcania and Aria; but the name was sometimes applied to the countries included in the later Parthian empire. It is difficult to define the boundaries of Parthia Proper, as they differed at various times. In the time of Strabo (xi. 514) Parthia extended on the west as far as Rhagæ and the Tapuri to the Caspian gates, and included the districts of Komisene (Kumis) and Chorene (Khuar). Pliny (vi. 29) says that it was bounded on the east by the Arii, on the south by the Carmani and Ariani, on the west by the Pratitæ Medi, and on the north by the Hyrcani.

The chief town of Parthia, and the only one in the country of any importance, was Hecatompylon, which, according to Strabo (xi. 514), was 1260 stadia from the Caspian gates. Quintus Curtius (vi. 2) says that it was founded by the Greeks; but the name, which is evidently Greek, is probably only a translation of a native word. The site of it is doubtful. Some writers identify it with the modern Damghan.

The Parthians were apparently of Scythian origin. According to Justin (xli. 1) their name signified in the Scythian language 'banished' or 'exiles.' The Parthians were subject to the Persian monarchy, and formed a satrapy together with the Chorasmii, Sogdi, and Arii. (Herod., iii. 93.) In the army of Xerxes they marched together with the Chorasmii, Sogdi, Gandarii, and Dadicæ (Herod., vii. 67); and in that of the last Darius they were united with the Hyrcanii and Tapuri under one commander. (Arrian, iii. 8.) Under Alexander, Parthia and Hyrcania together formed a satrapy (iii. 22), which also appears to have been the case under the Syrian kings.

On the death of Alexander, the Parthians espoused the side of Eumenes, and afterwards became subject successively to Antigonus and the Seleucidæ, till about B.C. 256, when they threw off the authority of the Syrian kings and were formed into an independent kingdom under the rule of Arsaces I. [ARSACES], from whom the succeeding kings received the title of Arsacidæ. His reign was the beginning of that great Parthian empire, which was gradually increased at the expense of the Syrian kingdom in the west and the Bactrian in the east; and at length extended from the Euphrates to the Indus, and from the Oxus to the Persian Gulf. In the time of Pliny (vi. 29) it was divided into 18 satrapies. The government was monarchical, but the kings were elected from the house of the Arsacidæ, and do not appear to have succeeded to the throne according to any acknowledged principle, and we thus constantly read of pretenders to the throne. Strabo says (xi. 515) that there were two supreme councils, one consisting of kindred, by which he probably means the family of the Arsacidæ; and the other of wise men and magi, from both of which the kings were chosen.

The Parthian empire lasted from B.C. 256 to A.D. 226. Its history may be divided into three periods:—

First Period, from B.C. 256 *to* B.C. 130.—During this period the Parthians were engaged in almost continual struggles with the Syrian kings. Under Mithridates I., the fifth or sixth in succession from Arsaces I., the dominions of the Parthian kings were extended as far as the Euphrates and the Indus; and Demetrius II., king of Syria, was defeated and taken prisoner about B.C. 140. Mithridates was succeeded by Phraates II., whose dominions were invaded by Antiochus Sidetes, the brother and successor of Demetrius. Antiochus met with considerable success at first, and defeated several armies of Phraates; but he was afterwards cut off with his whole army, about B.C. 130, and Parthia was from this time entirely delivered from the attacks of the Syrian kings. (Joseph., xiii. 8; Appian, *Syr.*, c. 68.)

Second Period, from B.C. 130-53.—During the early part of this period the Parthians were constantly engaged in wars with the nomade tribes of central Asia, who, after the destruction of the Greek kingdom in Bactria, attempted to obtain possession of the western parts of Asia. Phraates II. and his successor Artabanus fell in battle against these invaders; but their farther progress was effectually stopped by Mithridates II. (B.C. 124-87), who met however with a powerful rival in Tigranes, king of Armenia. Tigranes obtained possession of some of the western provinces of the Parthian empire; but after his conquest by the Romans, at the end of the Mithridatic war, the Parthians again acquired their former power, and were brought into immediate contact with the Romans.

Third Period, from B.C. 53 *to* A.D. 226, comprising the wars with the Romans. The invasion of Crassus during the reign of Orodes terminated in the death of the Roman general and the destruction of his army, B.C. 53. [CRASSUS.] In consequence of this victory the Parthians obtained a great increase of power. They invaded Syria in the following year, but were driven back by Cassius, the proconsul of the province, much to the relief of Cicero, who was at that time governor of the neighbouring province of Cilicia, and who appears from his letters to Atticus to have been very uneasy at the approach of the Parthians. In the war between Cæsar and Pompey, they took the side of Pompey; and after the death of Cæsar, they sided with Brutus and Cassius. Orodes, at the instigation of Labienus, the son of the Labienus who was Cæsar's lieutenant-general in Gaul, sent an army into Syria (B.C. 49), commanded by Pacorus and Labienus (Dion Cass., xlviii. 24; Vell., ii. 78); but they were defeated in the following year by Ventidius, the lieutenant of Antony (Dion Cass., xlviii. 39-41; Liv., *Ep.*, 127; Plut., *Ant.*, c. 33), and again in B.C. 38 (Dion Cass., xlix. 19, 20; Plut., *Ant.*, 34; Liv., *Ep.*, 138).

In B.C. 37, Orodes was murdered by his son Phraates IV., an ambitious and energetic prince, who, as soon as he obtained the throne, made great preparations for renewing the war with the Romans. To prevent the invasion of Syria again, Antony marched into Media against him, but was obliged to retire with great loss, B.C. 36 (Dion Cass., xlix. 25-31; Plut., *Ant.*, 37-51). Phraates however was unable to follow up his victory in consequence of having to contend with Tiridates, a formidable competitor for the Parthian throne. After an obstinate struggle, Tiridates was defeated, B.C. 25; but he contrived to get into his power the youngest son of Phraates, with whom he fled to Rome, and besought the assistance of Augustus. Menaced by a Roman invasion, and in danger from a large party of his own subjects, Phraates willingly made great concessions to Augustus. He sent four of his sons to Rome as hostages (Strabo, vi., p. 288; Tac., *Ann.*, ii. 1), and restored to Augustus (B.C. 29) the Roman standards which had been taken on the defeat of Crassus (Dion Cass., liv. 8; Suet., *Aug.*, 22), an event which is frequently alluded to by the poets of the Augustan age. A dispute subsequently arose (A.D. 2) between Augustus and Phraates respecting the kingdom of Armenia, on which account Caius Cæsar, the son of Agrippa, was sent into Asia with an army; but no hostilities ensued, in consequence of the submission of the Parthian king.

Phraates was assassinated A.D. 4, but his successor was also put to death after a reign of two years; and for several subsequent years Parthia was distracted by civil wars. In A.D. 16, Vonones, the eldest son of Phraates, who had been educated at Rome, was invited by the great body of the nation to occupy the throne; but his foreign education and Roman habits soon rendered him unpopular with his subjects (Tac., *Ann.*, ii. 2), and he was driven from the throne by Artabanus, a member of the family of the Arsacidæ (Tac., *Ann.*, ii. 3). In consequence of these troubles, Germanicus was sent into Asia, and concluded a peace with Artabanus. During the latter part of his reign, Artabanus was involved in hostilities with the Romans, and in contests with different competitors for the throne (Tac., *Ann.*, vi. 31-37). On the death of Artabanus, a civil war was again waged between his two sons for the succession to the throne, which ended in the victory of Bardanes (Tac., *Ann.*, xi. 9). On his death, A.D. 47, he was succeeded by his elder brother Gotarzes, to whom Claudius unsuccessfully opposed Meherdates, who had been educated at Rome (Tac., *Ann.*, xii. 10-14).

The numerous civil wars and the frequent revolt of the satraps had greatly weakened the power of the Parthians. The succession to the throne being uncertain, it was the great object of the Roman policy to support as much as possible pretenders to the throne, and thereby to weaken the kingdom by civil wars and to prevent all offensive operations on the part of the Parthians. The great subject of contention between the Romans and Parthians was the kingdom of Armenia, which had kings of its own, and was nominally independent, but its rulers were always appointed either by the Parthians or the Romans, and the attempts of each nation to place its own dependents on the throne led to almost incessant wars between them. Thus in the reign of Nero, the Parthians appointed Tiridates king of Armenia, and the Romans Tigranes, a descendant of Herod the Great; which dispute occasioned a war between the two nations, in which Corbulo invaded Armenia and obtained great success (Tac., *Ann.*, xiv. 24, 25). A similar dispute in the reign of Trajan occasioned a war between the Romans and Parthians, hich Armenia and Mesopotamia were converted into an provinces, and a new king of the Parthians appointed rajan (A.D. 114-116). During the reign of Hadrian however the conquered territory was given up, and the Euphrates again became the boundary of Parthia. The two nations remained at peace with one another till the reign of M. Aurelius and L. Verus. Cassius, the general of Verus, met with great success in the war, and at length took and almost destroyed the powerful city of Seleucia on the Tigris, A.D. 165. Under the reign of Vologeses IV., the Parthian dominions were invaded by Septimus Severus, who took Ctesiphon and several other important towns, A.D. 198, and annexed to the Roman empire the important province of Osrhoene. (Bayer, *Historia Osrhoene et Edessana.*) Caracalla followed up the successes of his father A.D. 217 [CARACALLA]; and though his successor Macrinus made a disgraceful peace with the Parthians, their power had been greatly weakened by the conquests of Verus, Severus, and Caracalla. Artaxerxes, who had served with great reputation in the army of Artabanus, the last king of Parthia, took advantage of the weakened state of the monarchy to found a new dynasty. He represented himself as a descendant of the antient kings of Persia, and called upon the Persians to recover their independence. This call was readily responded to; a large Persian army was collected; the Parthians were defeated in three great battles, and Artaxerxes succeeded to all the dominions of the Parthian kings, and became the founder of the new Persian empire, which is usually known by that of the Sassanidæ.

PARTICIPLE (in Grammar), the name of one of the parts of speech into which grammarians have distributed the words of a language. The word 'participle' comes from the Latin word 'participium,' which is formed on the same analogy as 'mancipium' and 'principium,' and means literally 'part-taking.' It is said, according to the old grammarians, to have obtained this name in consequence of its partaking of the nature both of the verb and the noun. Horne Tooke defines a participle to be a 'verb adjective,' which is perhaps as good a definition as can be given.

The English language has only two participles, which are usually called present and past. The present participle ends in *ing*, but it originally ended in *and*, which is the same termination as occurs in the cognate languages, namely *ant* in the Sanskrit; *ont* in the Greek, as *τύπτ-οντ-ος*; *ent* in the Latin, as *reg-ent-is*; and *end* in the German, as *lieb-end*. The term *present* participle is however not very correct, as it often denotes the continuation of an action or a state of being independent of the notion of time. This participle is called by some grammarians the *active* participle, but it is also passive; thus in the expression 'he was building the house,' the participle is active; but when we say 'the house was building,' it must be regarded as passive. In such sentences as the preceding there is no ambiguity, but when we say 'the man was killing,' the knowledge of the subject can alone enable us to determine whether the man was active or passive. This ambiguity in the use of the participle in *ing* has led to the modern practice, which is gaining ground, of expressing the notion of a passive participle by means of the present participle of the verb 'to be' and the past tense of the verb which is to be employed, as 'being loved,' 'being praised,' &c., which expressions are certainly very awkward and unwarranted by the usage of our best writers, if they are not absolutely wrong.

The other participle in English is used to denote past time, and is generally formed by adding *en* or *ed* and *d*, as *brok-en*, *praise-d*, &c.

PARTICLE, which is derived from a Latin word (*particula*) meaning a small part, is a term employed in grammar, but with rather an uncertain signification. Some of the grammarians included under this name all the parts of speech except the verb and the noun, namely, prepositions, adverbs, conjunctions, and interjections. Words of this class are included under the term of 'particles' by the Arabic grammarians. According to this definition, such words as 'vehementer,' 'unexpectedly,' &c. would be considered particles; which is certainly contrary to the common notion which we attach to a particle. In fact we seem to regard as particles all those small words which serve to make the sense of a proposition more clear and precise, though they might sometimes be omitted without rendering the meaning unintelligible. To this class of words belong the Greek γὲ, ἄρα, τοὶ, δὴ, νῦν, &c., the English *truly*, *now*, &c.

PARTITION. [PARCENERS.]

PARTITION TREATIES were two treaties concluded in the reign of William III. of England for regulating succession to the dominions of the crown of Spain, to each of which that king was a principal party. The war with France, which had lasted since May, 1689, having been put an end to by the several treaties of peace signed at Ryswick by France, England, Spain, and Holland, on the 20th of September, 1697, and by Germany on the 30th of October following, the apparently fast approaching death of Charles II., king of Spain, threatened to give rise to a new general war if the succession to his dominions should not be previously settled by agreement among the lately belligerent powers. Charles had no issue either by his first wife, Maria Louisa of France, who had died in 1689, or by his second, who still survived, the palatine princess Marianne of Neuburg, and no prospect of having any. Nor had he any brother. Of two sisters, the elder, Maria Theresa, married to Louis XIV. of France, had died in 1683, leaving a son, Louis, styled the Dauphin; the younger, Margarita Theresa, who died in 1673, had left by her husband, the emperor Leopold I., a daughter Maria Antonietta, married to Maximilian Emanuel, elector of Bavaria, and, she having also died in 1692, her heir was her son, the electoral prince Joseph Ferdinand. Maria Theresa however had on her marriage expressly renounced for herself and her posterity all claim of succession to the Spanish crown; and no doubt had ever been expressed as to the validity of that renunciation, either in France or in Spain. Maria Antonietta had also on her marriage made a similar renunciation; but her act had never been confirmed by the king or cortes of Spain, and in that country it was generally regarded as of no force. Her son, the electoral prince, therefore was commonly looked upon in Spain as the rightful heir of his grand-uncle; and this was also the view taken by Charles II. himself. It was not that however of the prince's grandfather, the emperor Leopold: it was he who, having pretensions of his own to the Spanish succession, had compelled his daughter to renounce her maternal inheritance; and those pretensions he now brought forward in opposition to those of his grandson. He claimed both as the true heir male of Ferdinand and Isabella, the founders of the Spanish monarchy, through a genealogy which we need not stop to trace; and more especially as the nearest male heir of Philip III. of Spain, the grandfather of Charles II., through his mother Maria, who was a daughter of Philip III. This explanation will make sufficiently intelligible the arrangements of the two Treaties of Partition.

The first was signed at the Hague, by the plenipotentiaries of England, France, and Holland, on the 11th of October, 1698. It provided, in substance, that in the event of the death of Charles II., the reigning king of Spain, without issue, the dauphin of France should have, in full satisfaction and extinction of his claims upon the Spanish succession, the kingdoms of Naples and Sicily, Sancto Stefano and the five other small islands on the coast of Sicily then held by Spain, the town and marquisate of Final, and the province of Guipuzcoa (with the exception of any places therein which might be found to lie beyond the Pyrenees); that to satisfy the claims of the emperor, the duchy of Milan should be made over to his second son, the archduke Charles; and that, with these exceptions, the crown of Spain, and all the kingdoms, islands, states, countries, and places then depending thereon, should be given and assigned to the prince, eldest son of the elector of Bavaria. In this way the share of the electoral prince, and the future extent of the Spanish dominion, was limited to Spain, the Netherlands, and America. It was intended that this arrangement, which was made with the greatest secrecy, should be kept a secret from the court of Madrid; but that court early obtained information of it (probably through the French king), the consequence of which was that Charles, in the indignation and unwonted vigour to which he was roused, made a will, naming the electoral prince of Bavaria his universal heir. Only a few weeks after this, in February, 1699, the electoral prince died, in his seventh year—poisoned, as his father did not hesitate to assert, by the contrivance of his own grandfather, the emperor. On this was arranged and concluded the Second Partition Treaty, between the same three, or rather two, powers which had been parties to the first, for William represented both England and the States-General of Holland. By this compact, which was signed at London, on the 3rd of March, 1700, the crown of Spain, with the territories formerly allotted to the electoral prince of Bavaria, was assigned to the archduke Charles of Austria; and the dauphin was to have the same share as before, with the addition of the duchies of Lorraine and Bar, which the duke of Lorraine was to be obliged to quit and exchange for the duchy of Milan. In his intrigues at the court of Madrid however Louis XIV. had consented to substitute for the dauphin and his heirs, the second son of that prince, Philip, duke of Anjou, if he could secure for him and his descendants the entire Spanish succession. At last, on the 2nd of October, this same year, the feeble and long-wavering Charles was prevailed upon to sign a will to that effect. He died on the 3rd of November following. The duke of Anjou was immediately declared by his grandfather king of Spain and the Indies, by the name of Philip V.; and the contest between him and Charles of Austria, or, as he called himself, Charles III. of Spain, occasioned the general war which was only terminated by the peace of Utrecht, in 1713.

PARTNERSHIP may be defined to be a contract between two or more persons for joining together their money, goods, labour, and skill, or any or all of them, upon an agreement that the gain or loss shall be divided between them; and its object must be some legal trade or transaction. The English law of partnership is founded on the common law, the so-called law of merchants, and the Roman law. By the common law a partner has no power to bind his co-partner by deed. By the law of merchants he has power to bind his co-partner by a bill of exchange, and there is no survivorship in the partnership stock. From the Roman law is derived the principle that a partnership is terminated by the death of a partner. (Gaius, iii. 152.)

If the judges have any doubt about the custom of merchants, they may send to them to know their custom, as they may send for the civilians to know their law; but the judges only recognise those customs of merchants that are general, not those that are particular usages.

We shall first speak of private unincorporated partnerships, to constitute which no writing is necessary. The acts of the parties, when there is no partnership contract in writing, are the evidence of the contract. Partners may be either ostensible, nominal, or dormant. He whose name appears to the world as a partner is an ostensible partner. An ostensible partner may or may not have an interest in the concern; if he has no interest in the concern, but allows his name to appear as one of the firm, he is a nominal partner; if his name and transactions as a partner are purposely concealed from the world, he is a dormant partner. But if his name and transactions are actually unknown to the world, he is more properly termed a secret partner. Generally speaking, any number of persons may be partners, but there are some exceptions, which are noticed under the head of 'Particular Partnerships.'

Any person of sound mind and not under any legal disability may be a partner. An infant may enter into this, as into any other trading contract which may possibly turn out to his advantage. It may however be avoided by him on coming of age, though the person with whom he contracts will be bound. An alien friend may be a trader and sue in personal actions, and may therefore be a partner. But an Englishman domiciled in a foreign country at war with England, or an alien enemy, cannot be a partner with a person in this country; at least he cannot sue in this country for a debt due to the firm. Married women are legally incapacitated from entering into the contract of partnership; and although they are sometimes, under positive covenants, entitled to shares in banking-houses and other mercantile concerns, yet in these cases their husbands are entitled to such shares, and become partners. If parties share in the profit and loss, they are partners, although one may bring into the trade money, another goods, and a third labour and skill, which was also the rule of the Roman law (Gaius, iii. 149); and where one party is sole owner of goods and another sole disposer or manager of them, if they share the profits, they are partners in those profits. Every man who has a share of the profits of a trade must also bear his share of the loss; for a right to a share of the profit legally implies a liability to bear a share of the loss. Yet it is not necessary to the partnership contract that every party should undertake to share the loss, for one may stipulate to be free from all liability to loss, and such stipulation will hold good as between himself and his co-contractors, which was also the rule of the Roman law, though he will still be liable to all those who have dealt with the firm of which he is a member. Persons who jointly purchase goods are not partners, unless they are jointly concerned in the profit or the produce arising from the sale of them. It is not necessary that the division of profit and loss among partners should be equal: it is sufficient that the parties share the profits, in order to render them partners. If they share the profits, they are by consequence bound to share the losses. But to constitute a man a partner on the ground of sharing profits, he must have an interest in the profits, as a principal in the firm; if he only receive a portion of the profits, by way of payment for his labour, trouble, or skill as a servant or agent of the concern, he is not a partner. Factors and brokers who receive a commission out of the profits of goods sold by them are not on that account partners with their principals; nor are persons who receive a certain share of the profits of an adventure, as payment in lieu of wages for acting as servants, partners in the adventure; nor even are persons who receive wages in proportion to the profits of the undertaking considered as partners. If a person lend money to a firm, and receives an annuity or interest, certain as to amount and duration, he is not a partner; but if he were to receive an annuity in lieu of the profits of the trade, and determinable on the event of the trade ceasing, it seems that he would be considered as a partner with the grantor of the annuity; or if he received an annuity varying in amount with the profits, he would be clearly a partner in the concern.

The contract of partnership must be formed for the purpose of some lawful trade, business, or adventure. If the subject of the contract be illegal, there can be no partnership founded upon it, so as to give the contractors a remedy against each other, or against third persons, at law or in equity; and if there be an illegal contract of partnership which is not executed, but executory only, none who are parties to it can by action or suit recover the money advanced for the purpose of establishing the partnership. A contract originally entered into for the purpose of evading the usury laws, and not *bonâ fide* with the view of partnership, cannot be supported as a legal contract: nor can a partnership between attorneys, where one of them is not duly qualified, be sustained. A partnership for importing prohibited goods, or making time bargains in the funds, would be held illegal and invalid, not less than a partnership for keeping a disorderly house, or robbing on the highway, or for acting plays within such distance from London as is forbidden by statute.

A person may stipulate not to be a partner, but if he shares the profit with those with whom he stipulates, he becomes a partner so far as relates to his liability to a third party. And if persons be known to share the profits of a trade, it is presumed that they are partners, and as such, liable to all who deal with the firm, whatever be the private agreement among themselves. But they may repel the presumption of partnership by showing that the legal relation of partnership among themselves does not exist. If a person allow his name to be used in a business, or in any other way consent to appear as a partner, he will be so considered with respect to other persons, whatever may be his agreement with the firm; and he will be equally responsible to third parties with the other partners, although he may not receive or be entitled to receive any of the profits. The ground of this rule of law is clear and reasonable: a person must be considered bound by a contract, if he act in such a way as to make other contracting parties believe that he is a party to the contract; and such is the case with a man who allows his name to appear as a member of a firm, as to all contracts and dealings which are necessary for carrying on the business of the firm.

A partnership at will is one which continues as long as the parties live and are able and willing to continue it: a partnership for a fixed term continues for the term if the parties live and are of legal capacity to continue it. A partnership at will may be dissolved at any time by the expressed will of any member of it, a rule which is derived from the Roman law, and which is a necessary consequence of the nature of the partnership contract. In such case the partnership is dissolved immediately upon notice given by any of the partners. The effect of such dissolution is to stop all new partnership dealings or contracts; but the partnership still continues for the purpose of completing all contracts already made, and all dealings or undertakings already commenced. On such dissolution, any partner is entitled to have the whole partnership stock, and the interest in the premises on which the business is carried on, converted into money, and to receive his share of the produce. In all cases, by the natural death of a partner, the partnership is dissolved, a rule also derived from the Roman law, as already stated: it is also dissolved by a partner's civil death, as his outlawry, or attainder for treason or felony; for an outlaw, being dead in law, incapable of entering into any contract, bringing any suit, or holding any property, a partnership in which he is engaged is therefore dissolved; and, strictly speaking, the whole property is forfeited to the crown; for as the king never becomes joint tenant, or tenant in common with the other partner, the crown takes the whole; but this right is seldom enforced against creditors or innocent partners. A marriage of a feme-sole trader is also a dissolution of a partnership at will. A partnership for a term may be dissolved before its expiration by the mutual consent of the parties, by the decree of a court of equity, or by the bankruptcy, outlawry, or felony of any of the partners. A court of equity will in some cases dissolve a partnership on the ground of incurable insanity in one of the partnership. A partner may agree that upon his death the business may be carried on beyond the legal period of dissolution in the hands of his children or other third parties, but this is properly an agreement for a new partnership. Partners cannot be relieved from future liabilities to third parties without notice to them and to the world in general that the partnership has ceased; but in the case of a dormant partner, if none of the creditors know that he is a partner, no notice of his retirement from the firm is necessary; and if it be known to some, notice to such only will be sufficient. On the death of a partner, notice of the dissolution to third parties is unnecessary.

Partners are joint tenants in the stock and all effects; yet there is no survivorship in equity, or, as it has been said, at law, in such part of the stock as is moveable. Upon the decease of a partner, his personal representatives become entitled to his share of the moveable stock and effects, and they thereupon become in equity, and, as it has been said, at law, tenants in common with the surviving partners. If, as is generally the case in the purchase of lands for the purposes of a partnership, they are conveyed to the partners as tenants in common, and one of the partners should die intestate, the legal estate in his share will descend to his heir, who will be tenant in common with the other partners. If the lands were conveyed to them as joint tenants, there will be no survivorship in equity; and it becomes then a question whether, upon the death of a joint trader, who, with his partners, has purchased lands for the purpose of the trade, *his share* will descend for the benefit of his heir or his next *of kin*; and the better opinion seems to be, although the point has never been decided, that although the legal estate in freehold property purchased by partners for the purposes of their trade will go in the ordinary course of descent, yet the equitable interest will be held to be part of the partnership stock, and distributable as personal estate. It is scarcely necessary to observe, that upon the purchase of lands, they may be expressly conveyed so as to be always held as real estate, and descend to the heirs of the several partners.

It sometimes happens that one person supplies goods for an adventure, and another only his time, trouble, and credit; yet if in the agreement between the parties there are words which imply a joint undertaking, these words are evidence of an intention to share jointly the goods and also the profits of them.

There is an implied obligation, in the absence of express stipulation, among partners to use the property for the benefit of all of them: and any fraud on the part of one partner, either by misapplication of the partnership fund or in any other way, is a matter of which a court of equity will take cognizance. No partner has a right to engage in any business or speculation which must necessarily deprive the partnership of his time, skill, and labour, because it is the duty of each to devote himself to the interest of the firm. It is the duty of each partner to keep precise accounts, and to have them always ready for the inspection of his co-partner. Each partner is liable to the performance of all contracts of his co-partners, in the same manner as if entered into personally by himself, provided they relate to matters which are within the objects and purposes of the partnership. If the parties to the contract of partnership do not regulate it by express stipulation amongst themselves, the contract, with its duties and obligations, will be implied and enforced by the rules of law applicable to persons in such relative situations; and where the contract does not reach all the duties and obligations, such omissions will be supplied by the same rules of law. Though partners may have entered into a written agreement which specified the terms on which the joint concern is to be carried on, yet, if there be such a course of dealing as leads to the conclusion that they have agreed to change the terms of the original written agreement, they will be considered to have done so. For instance, if the agreement be that no partner shall draw or accept a bill of exchange in his own name, without the concurrence of all the others, yet, if they afterwards adopt a practice of permitting one of them to draw or accept bills without the concurrence of the others, it will be held that they have so far varied the terms of the original agreement. The transactions of partners are always to be looked to in order to determine between them, even against the written articles, what clauses in those articles will not bind them. It is impossible to state all the varieties of stipulation which are introduced into partnership articles; it will be sufficient to repeat that within the limits before laid down, the parties may enter into such stipulations as they please.

One partner may maintain an action of covenant against his co-partner, whether the covenant be for the payment of money or the performance of any act for commencing or establishing the partnership, or for the performance of any of the articles after the partnership has commenced; and if adequate compensation for the breach cannot be had at law, a court of equity will enforce a specific performance of the covenant itself. Courts of law do not allow actions of debt by one partner against another for money due upon simple contract, as for money laid out by one partner for the purposes of the partnership. The partner who is aggrieved must therefore enforce his remedy by action of account, or by an application to a court of equity, by filing a bill for an account and a dissolution of the partnership. A partner cannot maintain an action of debt against his co-partner for work and labour performed, or money expended on account of the partnership; if therefore he has a claim upon his co-partner for a sum of money due on account of the partnership, but not constituting the balance of a separate account, or a general balance of all accounts, his only mode of recovering the amount is by an action of account, or by a bill in a court of equity praying for an account, and usually also for a dissolution. If it turn out that an undertaking is impracticable, as if a machine, for the working of which the partnership was entered into, will not answer the purposes intended, and so the object of the partners is frustrated, or if either party commit fraud, or gross acts of carelessness or waste in the administration of the partnership, the party aggrieved has a right to a dissolution, and the same will be decreed in equity. A partner is also entitled to an account of the partnership assets against his co-partner, but it was formerly held that he could not have it pending the partnership. If therefore he filed his bill for an account, it was also necessary to pray for a dissolution. It is now considered that a partner may have such an account on stating a proper case, without asking for a dissolution; but, considering the circumstances under which a partner files a bill for an account of partnership dealings, it will seldom happen that it will be his interest not to pray for a dissolution of the partnership. Where one partner has committed such breaches of duty as would warrant a decree for a dissolution, a court of equity will interfere summarily by injunction: as where one partner has involved the partnership in debt, or has himself become insolvent, the court will restrain him from drawing, accepting, or indorsing bills in the name of the firm, from receiving the partnership debts, and from continuing to carry on the business by entering into new contracts. It will also restrain an action brought by one partner against his co-partner on a separate and private account, upon payment by the latter of the money into court. So it will restrain the application of the partnership property to a use not warranted by the articles; or an execution against the partnership property for the separate debt of one partner. A court of equity will appoint a receiver where one partner excludes another from taking such part in the concern as he is entitled to take, and will do this even with a view to the continuance of the co-partnership, if it is for the benefit of the contracting partners, although such a step is usually taken with a view to a dissolution and winding up of the partnership affairs. Whether the party applying for a receiver wish a continuance or dissolution of the partnership, he must make out such a case to induce the court to interfere, as would authorise a decree for a dissolution.

Generally speaking one partner has an implied authority to bind the firm by contracts relating to the partnership, and he can do this by mere verbal or written agreements, or by negotiable securities, such as bills of exchange and promissory notes. One partner may pledge the credit of the firm to any amount; but there are some exceptions to this rule. A dormant partner is in all cases liable for the contracts of the firm during the time that he is actually a partner; and a nominal partner is in the same manner liable during the time that he holds himself out to the world as a partner. Partners can make no arrangements among themselves which will limit or prevent their ordinary responsibilities to third parties. The power of one partner, above alluded to, to bind his co-partner, is implied in law, no express authority from the latter being necessary for that purpose; and in the case of bills of exchange, it exists by custom which has been judicially recognised. One partner may give a guarantee for himself and his partners, and the firm will be bound by it, if it be made in a matter relating to the partnership. The act and assurance of one partner, made with reference to business transacted by the firm, will bind all the partners. A partner will also be liable in respect of a fraud committed by his co-partner, if committed in the capacity of partner, in contracts relating to the co-partnership, made with innocent third persons. Thus, if a partner purchase goods such as are used in the business, and fraudulently convert them to his own use, the innocent partner, provided there be no collusion between the seller and the buyer, is liable for the price of the articles. But partners are not liable for the wrongs of each other, excepting where one partner acts as the servant of the rest, in which case the whole of the partners are liable to the consequences of any wrong he may do; and they may be proceeded against altogether, or one may be sued alone for the whole of the damage done. One partner has no implied authority to bind his co-partner by deed, yet if he execute a deed on behalf of the firm, in the presence of and with the consent of his co-partners, it will bind the firm. It seems that a release by one of several partners to a debtor of the firm binds the firm; but if such release be fraudulent, it will be set aside by a court of equity; and even a court of law will interfere to prevent a fraudulent release from being pleaded.

Where no time is mentioned in the deed of partnership for its commencement, the liabilities of the firm will commence from the date of the deed; but in adventures, unless the parties have previously held themselves out as partners, the liabilities commence from the time fixed by the contract. An in-coming partner is not liable for debts contracted before he joined the firm, but if he pay any of the old debts or interest upon them, or does other special acts, he may render himself liable in equity. In an adventure an in-coming partner is not liable for the price of the goods. When an infant partner comes of age, and does not disaffirm the partnership, if he wish to avoid being liable for the future debts, he must give the creditors notice of his disaffirmance: but for the past contracts he cannot be sued unless he promise to pay, or his ratification of the debts contracted in infancy be made in writing. On the retirement of an ostensible partner, notice of his retirement must be given, or he will be liable to the creditors of the continuing firm for subsequent contracts made by them, and such notice is usually given in the Gazette; but notice in the Gazette will not bind creditors who are not shown to have seen the notice. Third persons have a claim against a dormant partner for contracts entered into by the firm while he was a partner. This claim is founded on such dormant partner being actually a partner; and therefore it is unnecessary, on the dissolution of a partnership between an ostensible and a dormant partner, to give notice of the dissolution to the creditors, in order to protect the latter from subsequent contracts; for when the dormant partner has ceased to be a partner, he is relieved from all future liability.

It is collected from the majority of cases that a partnership contract is joint (not joint and several) both at law and in equity. Upon the death of a partner therefore the legal remedy against him in respect to the joint contract is extinguished, and the creditor can maintain an action against the surviving partners only. But the rule of equity as applicable to partners with respect to third parties was considered to be that the joint debts should be satisfied out of the joint estate; if that were insufficient, then subject to the claims of their separate creditors out of their separate estates proportionally; and if any of them were insolvent, then out of the remaining separate estates proportionally. But the case of *Devaynes* v. *Noble* (1 Mer., 529), since affirmed on appeal by Lord Brougham (2 R. & M. 495), has established the principle that a partnership contract is several as well as joint; and that a partnership creditor may have recourse for full payment to the estate of a deceased partner. And the same judge (Sir W. Grant) who decided that case, declared that a partnership debt has been treated in equity as the several debt of each partner, though at law it is only the joint debt of all. By this decision it appears that a joint creditor on the death of one partner obtains a more advantageous remedy against his estate than he would have had against his separate estate if living. But it seems doubtful whether this point can be considered as finally settled.

It has been before said that notice of the decease of a partner to the creditors of the firm is not necessary to free his estate from future liability; but it is otherwise if one of the surviving partners be executor of the deceased. A deceased partner sometimes directs his executors to continue the trade; in that case his estate will be liable to the extent to which he directs his assets to be employed. If the executor exceed that limit, he becomes personally responsible.

In actions by partners, all the partners may, and all ostensible partners must, join as plaintiffs, unless the contract upon which the action is brought be in writing under seal, when only those partners who are included can sue thereon. But if a contract not under seal be made by some, for the benefit of themselves and others, those for whose benefit it is made, as well as those whose names appear on the contract, may sue. Parties to a legal partnership cannot recover upon an illegal contract, although its illegality, at the time it was made, were only known to one of the members of the firm. Persons who may legally be partners in foreign countries, as husband and wife, cannot sue here as partners, for by the law of England husband and wife are not permitted to sue as partners. On the other hand, partners trading abroad in such a manner as to make a partnership here, may sue as partners for consignments sent to this country, though they cannot sue as partners at the place of trading by reason of the particular law of that place. The construction of contracts is governed by the laws of the country in which they are made; but remedies must be pursued by the means pointed out by the law of the country whose tribunals are appealed to. The laws of the country where the contract was made can only have a reference to the nature of the contract, not to the mode of enforcing it. If partners have occasion to prefer an indictment relating to the partnership property, such property may be stated in the indictment as belonging to one of them by name, and to another or others, as the case may be. But though it is not necessary to name all the partners, yet where there are other partners, that fact should appear in the indictment, or the prisoner must be acquitted.

A whole firm may become bankrupt, or some or one only of the partners may become so, whilst the remaining members may be solvent; but those only of the partners who have committed acts of bankruptcy are to be deemed bankrupts; and to constitute two or more bankrupts under a single fiat, there must be evidence of joint trading. Upon the bankruptcy, the whole of the bankrupt's property vests absolutely in the assignees, who have the same remedy by action for the recovery of the debts due to the bankrupt, and for the redress of all civil injuries with respect to the property passing to them under the fiat, as the bankrupt would have had if no fiat had issued. Accordingly, when the bankruptcy is separate, the solvent partners join with the assignees in an action for the recovery of the joint debts. On the bankruptcy of one partner, the solvent partners become tenants in common with the assignees of all the partnership effects. Upon the bankruptcy of one partner, under a separate fiat issued against him, his assignees take all his separate property and all his interest in the joint property; and if a joint fiat issue against all, the assignees take all the joint property, and all the separate property of each individual partner. Joint estate is that in which the partners are jointly interested for the purposes of the partnership at the time of the bankruptcy. Separate estate is that in which the partners are each separately interested at that time. Joint debts are those for which an action, if brought, must be brought against all the partners constituting the firm; in all cases therefore when a partner becomes liable for a debt contracted by his copartners, a joint debt is created, and the creditor is a joint creditor of the firm. Separate debts are those for which the creditor can have his remedy at law against that partner only who contracted them.

Particular Partnerships, Joint-Stock Companies, Banks, Mines, and Ships.

Joint-stock companies are such companies as are unincorporated, and which trade upon a joint stock. All trading associations, however numerous, and although unsupported by charter or act of parliament, are legal, provided their purposes be legal, and provided they do not attempt to exercise the privileges of a corporation, such as the power of making their shares transferrable at the will of the holder. If a man execute the deed of settlement of a company or association of individuals, or if by his letters or admissions it can be proved that he was really a partner according to the terms of that deed; or if he be proved to have done acts of management; or if he become a director, or otherwise hold himself out to the world as a partner, he is legally a partner in the company. The most conclusive evidence of partnership is the signing of the deed of settlement. But the signing of a prospectus of an intended company does not make a man liable to third persons.

The partners in joint-stock companies are of two classes: one consists of directors, trustees, and others who are actively employed in conducting the concern; the other, of a number of persons who take little or no part in its management, and many of whom become shareholders for the sake only of a profitable investment of their money. The general conduct of the trade falls upon the directors, whilst the more particular transactions are usually managed by paid agents who are not shareholders. The funds and other property of the company are vested in the trustees. The deed of settlement is a covenant made between a few of the shareholders chosen as trustees for that purpose, and the others; by which each of the latter covenants with the trustees, and each of the trustees covenants with the rest of the shareholders, for the due performance of a series of articles which are specifically set forth, and which point out the duties of the trustees, directors, and auditors; define their powers, and all other necessary matters. In all matters which might have been provided by the deed, but are not, the general law of partnership prevails. Unless therefore there be a stipulation to the contrary, every proprietor has a right to have free access at all times to the books of the company,

It follows from the nature of partnerships that a partner cannot assign his interest so as to make a stranger a partner. In order therefore that the shareholders of a trading company may be able to do this, there must be a provision to that effect in the deed. But as these shares cannot be legally transferred at the sole will of the holder, provisions must be inserted in the deed for giving due notice to the directors of the intended transfer or assignment. If a party having signed the deed wishes to retire from the concern, he must conform to the stipulations of the deed, which usually provides that any proprietor shall be permitted to retire upon payment of a certain sum in respect of his share, and upon giving notice to the directors. The legatees or next of kin of a shareholder become beneficially entitled to his interest in the company upon his decease, but neither they nor his executors or administrators will be entitled to stand in his situation as a partner, unless permitted to do so by the deed of settlement.

The private property, to its full extent, of every member of an unincorporated trading company is liable for the whole debts of the company. The most important object to be gained by an act of parliament for a joint-stock company is by the clause which enables it to sue and be sued through the medium of one of its officers; without which advantage the difficulties attendant upon suits by or against such companies are beyond calculation. The Court of Chancery however seems inclined to diminish the difficulties, for (in Taylor *v.* Salmon, 4 M. & C. 134) it was held that in a suit by the directors of a joint-stock company on behalf of themselves and all other shareholders to have the benefit of an agreement entered into by an agent of the company, not necessary that all the shareholders should be made parties.

With respect to banks, in the several acts of parliament relating to them restrictions are put upon the number of partners in those of a private nature, or, in other words, in private banks; but these restrictions have been in a great degree removed. Formerly no more than six persons could carry on the business of banking, but by 7 George IV., c. 46, more than six may do so in England, sixty-five miles from London, provided they have no house of business or establishment as bankers in London. Every member of the copartnership is responsible for all the debts of the company: they must not draw bills for less than 50*l.* upon any person living within sixty-five miles of London, and they must deliver to the stamp-office a statement of the names and places of abode of all the members, and also a list of their officers. They must also, by their secretary or other proper officer, send to the stamp-office a statement of the change of every officer, and of the names of all who cease to be proprietors or become new proprietors during the year. In Ireland, under the provisions of 1 and 2 George IV., c. 72, private banks may consist of more than six partners, if situate more than fifty Irish miles from Dublin. In Scotland there is no restriction of the number of partners.

A partnership in the working of a mine is considered by courts of equity as a partnership in a trade, and therefore subject to the usual rules as to partnership.

The legal condition of part-owners of ships is considered under SHIP.

The chief rules of Roman law as to partnership may be collected from Gaius, iii. 148-154; *Dig.*, xvii., tit. 2; Cicero, *Pro Publio Quintio*.

(Collyer 'On Partnership.')

PARTRIDGE. [PERDICIDÆ.]

PARTRIDGE WOOD, a kind of wood much esteemed for cabinet-work on account of its beautiful variegated and barred appearance, is commonly said to be furnished by the *Heisteria coccinea* of botanists, a small inelegant tree, about twenty feet high, found in Martinique by the side of torrents; but this appears to be a mistake which has arisen out of the name given to Heisteria in that colony. In the corrupt French of Martinique it is called *Bois Perdrix*, a name which, as Jacquin tells us, does not signify partridge-*wood*, but Partridge-*pea*, bois being used for pois; and the name is given to the plant, not because of the variegated wood resembling a partridge's wing, but because the wild pigeons are fond of the berries. Partridge-wood is said by Guibourt, who does not however give any authority for the statement, to be really a product of Cayenne, where it forms a tree 60 feet high, and is called Boco. Of this plant, called by Aublet *Bocoa prouacensis*, an account will be found in that author's *Plantes de la Guiane Française*, Supp., p. 38, t. 394; but it is now wholly unknown to botanists, its very name being omitted even in the most complete botanical systems. Aublet says it is found in the woods of Caux; and he supposes that its hard heart-wood would be a good material for the blocks or pulleys used in machinery; but he says nothing of its being exported to Europe.

PARTULA, a genus established by Férussac for a form of the family *Colimacea*, Lam. (*Auriculacea* of Férussac).

Generic Character.—*Animal* elongated, demicylindrical; *tentacles* two, cylindrical and retractile, ocellated at their summit. Ovoviviparous. Terrestrial.

Shell oval, pointed; spire conical, last whorl tumid, and larger than the rest put together; spiral whorls four to six. Aperture straight in the direction of the axis, short, sometimes toothed or furnished with elevated plates; peristome commonly very much reflected, with the edges on the same vertical plane; columellar side of the aperture callous at its base. Dextral or sinistral.

In addition to the species described by M. de Férussac, Broderip has described some brought home by Mr. Cuming, and collected by him in the islands (Polynesia) Otaheite and Huaheine, principally on the *Ti* plant and on bushes. (*Zool. Proc.*, 1832; Müller, *Synopsis*, 1836.)

PARUS. [TITMOUSE.]

PARUTA, PAOLO, born at Venice, in 1540, of a patrician family, studied in the university of Padua, and afterwards entered on the career of diplomacy. In 1562 he accompanied the Venetian ambassador, who was sent to Vienna to congratulate Maximilian II. on his accession to the throne. On his return he stopped at Trento, where the council was then assembled, and where he conceived the plan of his dialogues on political life, 'Della Perfezione della Vita Politica Libri III.,' in which he introduces two prelates of the council as the interlocutors. On his return to Venice, he filled several official stations in the service of his country, and in the year 1592 was sent ambassador to Pope Clement VIII. at Rome. He was there instrumental in persuading the pontiff to grant absolution to Henri IV. of France, and thus reconciling the latter with the church of Rome. (Andrea Morosini, *Storia Veneta*, b. xv.) While at Rome, he says, a change took place in his ideas, which had till then been turned towards ambition and worldly pursuits. He asked himself, 'What am I doing in this world? what am I thinking of? and what do I expect in the end?' The process and result of his self-examination, in which he recapitulated the whole of his past conduct, he has given us in his 'Soliloquy,' published at the end of his 'Discorsi Politici,' which forms a useful moral treatise.

Before he went to Rome he was appointed historiographer to the republic, in which capacity he continued the history of his country from 1513, where his predecessor Luigi Contarini had left it. The 'Istoria Veneziana dal 1513 al 1551' of Paruta is divided into twelve books. A distinguished Italian critic, Apostolo Zeno, says of this work, that 'the author has fulfilled the duties of a grave and able historian, both in respect to the veracity of his narrative and the dignity of his style.' Paruta also wrote a separate history of the eventful war of the Venetians against the Turks in the island of Cyprus in 1570-72, in three books. The histories of Paruta are not mere dry narratives of political or military events; they are intermixed with information and reflections concerning the civil history of the people, and the customs, manners, and opinions of the age. That branch of political knowledge now known by the name of statistics was attended to at Venice much sooner than in any other modern state, and Paruta had early applied himself to it.

Paruta's 'Political Discourses,' in two books, are a series of disquisitions upon the history of Greece and Rome, as well as upon various passages of modern history, and deserve, for their impartiality and statesmanlike penetration, to be put by the side of Machiavelli's 'Discourses on Livy.' Montesquieu is said to have availed himself of Paruta's 'Discourses' in the composition of his works. (Corniani, *Secoli della Letteratura Italiana*, art. 'Paruta.')

Paruta, after returning from his embassy at Rome, was made a knight and procuratore of St. Mark, and shortly after died at Venice, in 1598.

PAS DE CALAIS, a department in the northern part of France, bounded on the north-east and east by the department of Nord; on the north-west and west by the Strait of Dover (called by the French Pas de Calais, from which the department takes its name), and the English Channel (or La Manche); and on the south by the department of Somme. The form is irregular, having its greatest length from Cape Gris-Nez, at its north-western extremity, to the neighbourhood of Bapaume, at its south-eastern extremity, 87 miles, and its greatest breadth from the mouth of the Aa to that of the Authie, nearly 50 miles. The area is estimated at 2558 square miles, being considerably above the average area of the French departments, and rather less than the area of the English county of Devon (2585 square miles). The population, in 1831, was 655,215; in 1836, it was 664,654; showing an increase in five years of 9439, and giving nearly 262 inhabitants to a square mile. In amount and density of population it is very far above the average of France, and is exceeded in either respect by very few of the French departments; it is far superior to Devonshire. Arras, the chief town, is about 100 miles north by east of Paris in a direct line, or 109 miles through Senlis, Roye, Peronne, and Bapaume.

A ridge of high ground separating the streams which flow into the English Channel from those which fall into the North Sea enters the department near its south-eastern extremity, and for some distance runs westward, keeping near the southern border; it then turns more to the north-west, and terminates in the high cliffs of Cape Gris-Nez, between Calais and Boulogne. The department is comprehended in the chalk district which surrounds the Paris basin, and the cliffs of Gris-Nez, which are composed of chalk, bear a close resemblance to those of Dover. These cliffs extend for a few miles on each side of the headland; in some other parts the coast is low, and defended from the sea at high water by a natural barrier of sandy downs. The harbours are few, and none of them good, being encumbered with sand or the débris of the cliffs. Boulogne and Calais are the principal. The mineral treasures of the department comprehend limestone, sandstone, potters'-earth, some varieties of marble, coal, and peat. There is only one coal-pit, which in 1834 gave employment to 165 labourers, of whom 118 worked in the pit. The quantity of coal produced that year was 4461 tons; in 1835 the produce was 3736 tons. There was, in 1834, one iron-work, containing seven forges for making wrought-iron; coal and coke were the fuel employed.

The rivers and streams rise chiefly on the north-eastern slope of that ridge of high land which traverses the department. The Sensée, the Scarpe, and the Lys are feeders of the Escaut, or Schelde. The Sensée rises near Bapaume, and flows north-east 16 miles to L'Ecluse, on the border of the department of Nord, and then eastward along the border for about six miles more. It receives the Cojeuil and the Hirondelle. The Scarpe rises between St. Pol and Arras, and flows east to Arras, just above which it receives the Gy. At Arras it becomes navigable, and flows still eastward past Vitry to Douay in the department of Nord. Its whole course in the department of Pas de Calais may be estimated at 26 miles, for more than half of which it is navigable. The Lys rises near Fruges, and flows north-east past Therouenne to Aire, where it is made navigable, and flows eastward into the department of Nord. It afterwards skirts for a short distance the boundary of the two departments. The Nave and the Clarence unite and flow into the Lys; and the Lawe, which becomes navigable at Bethune, falls into the same river. The Souchez flows into the Deule, a tributary of the Lys, belonging to the department of Nord. The Aa rises between Montreuil and St. Omer, flows past St. Omer to the boundary of the department, and then along the boundary into the sea at Gravelines. Its whole course is about 50 miles: it is navigable from St. Omer.

The rivers on the southern slope are the Liane, the Canche, and the Authie, the last of which separates this department from that of Somme. The Liane, which is very small, flows into the harbour of Boulogne. The Canche rises not far from the head of the Scarpe, and has a north-westward course of about 44 miles, past Hesdin, Montreuil, and Etaples: it is navigable from Montreuil to the sea, about 8 miles. It receives the Ternoise (which in some maps is also called Canche) from the neighbourhood of St. Pol. The Authie rises just on the border of the department, and has the first few miles of its course in that of Somme. It then touches the border again, and flows north-west into the sea. Its whole course is above 50 miles, but no part of it is navigable.

The Calais and St. Omer canal extends from Calais to the Aa, by the navigation of which it communicates with St. Omer: it has two short branches, the canals of Guines and of Ardres. From St. Omer the line of inland navigation is continued by the Neuf-Fossé canal to Aire; and from Aire by another canal to La Bassée, just within the department of Nord. Part of the Haute Deule navigation between Douay and Lille (Nord) passes through this department east of Lens. The whole of the inland navigation of the department is thus given in the official statements (*Statistique de la France*):—

Rivers.	Miles.	Canals.	Miles.
Aa . .	19	Calais and St. Omer canal .	18½
Canche .	7½	Guines branch . . .	4
Lawe . .	9	Ardres ditto . . .	3
Lys . .	6½	Neuf-Fossé canal . .	6½
Scarpe . .	15	Aire and La Bassée canal .	24
	—	Haute Deule canal .	11
	57		——
		Total of canal navigation	67
		Total of river navigation	57
			——
		Total of inland navigation	124

The department is traversed by thirteen government roads (*Routes Royales*), having an aggregate length of 423 miles, viz. 232 miles in good repair and 191 miles out of repair; and by forty four roads under the direction of the depart- authorities (*Routes Départmentales*), having an ag- length of 217 miles, viz. 101 in good repair, 58 out r, and 58 unfinished. The principal roads are those to Calais, Dunkerque, and Lille. The main road from Paris to Calais enters the department by a bridge over the Authie at Nampont, and passes by Montreuil, Samer, and Boulogne. Another and more inland road to Calais passes by Hesdin, Fruges, Fauquemberg, St. Omer, and Ardres. One road to Dunkerque passes by St. Pol, Pernes, Lillers, and Aire; and another by Bapaume, Arras, Béthune, and Lillers, where it joins the other road. There are three roads to Lille, one by St. Pol, Béthune, and La Bassée; the second by Arras and Lens; and the third and principal one by Cambray, which just crosses the eastern extremity of the department. There are cross-roads from Montreuil by Hesdin, St. Pol, and Arras to Cambray; from Boulogne by St. Omer, Aire, Lillers, Béthune, and Lens to Douay; from Calais by Gravelines to Dunkerque; and there are roads from Arras to Béthune, to Lens, to Douay (Nord), and to Doulens and Abbeville. A road from Paris by Amiens to Cambray passes through Bapaume.

The climate of the department is changeable; the soil is generally fertile, and well cultivated. The farms are of greater extent and the agricultural operations are carried on on a larger scale than is usual in France. The area of the department is estimated at more than 1,600,000 acres, and nearly four-fifths of it are under the plough. The grain principally cultivated is wheat, the produce of which is more than three times as great as the average produce of the French departments: in rye and maslin, as well as in barley, the produce is considerably below the average, and in oats little more than one-third of the average. From the great preponderance of the wheat crop, the grain harvest is however, as a whole, nearly double the average of the other departments. Potatoes are cultivated to a considerable extent; and in the northern part of the department, where the husbandry is assimilated to that of the department of Nord, colza, rape, and other oleaginous plants are much grown, as also beet-root for the manufacture of sugar. The refuse, after the extraction of the sugar, is used for sheep feed, and is so valuable as to pay for a large part of labour of manufacturing the sugar. The meadow land comprehends more than 100,000 acres, and there are 40,000 acres of heath or other open pasture-ground. The number of horses is nearly three times the average number in the French departments: the excess is owing to their being employed more extensively than usual in the labours of agriculture. In the number of cows and heifers this department has also a great predominance, but in the number of bulls and oxen it falls very short. On the whole, the number of horned cattle is considerably above the average of the departments; and the same is the case with sheep, of which many are merinos, or of the long-woolled English breeds. Swine and poultry are abundant. The woodlands occupy about 100,000 acres, but are not sufficient to supply the department with fuel. A considerable quantity of coal is imported from the department of Nord and from Belgium. Orchards are very general, and occupy from 45,000 to 50,000 acres. The climate does not admit the growth of the vine. Wine, imported from the other departments, and beer, are the common beverage of the inhabitants.

The department is divided into six arrondissemens, as follows:—

		Area in Sq. Miles.	Population. 1831.	1836.
Arras	S.E.	535	163,672	163,032
Béthune	N.E.	357	131,849	131,973
St. Omer	N.	419	103,073	105,020
St. Pol	S.	437	80,676	80,566
Boulogne	N.W.	364	98,099	105,465
Montreuil	S.W.	436	77,846	78,658
		2538	655,215	664,654

The number of cantons or districts, each under a justice of the peace, is 43; the number of communes 903, viz. the arrondissement of Arras 211, of Béthune 142, of St. Omer 117, of St. Pol 193, of Boulogne 99, and of Montreuil 141.

In the arrondissement of Arras are—Arras, the capital of the department (population in 1831, 23,419; in 1836, [illegible]) [ARRAS] and Vitry (population 2276 town, 2310 whole commune), on the Scarpe; Bapaume (population 3071 town, 3195 whole commune), near the source of the Sensée [BAPAUME]; Oisy (population 2116 town, 2148 whole commune), near the Hirondelle; and Pas, near the source of the Authie. Peat is dug in the neighbourhood of Oisy. It has oil-presses and tan-yards; some manufactures of cot yarn and cotton velvet are carried on. There are twelve fairs in the year. The population is about 7000.

In the arrondissement of Béthune are—Béthune (population in 1831, 6889; in 1836, 6903) [Béthune], Houdain, and La Ventie, on or near the Lawe; Lens (population 2561), near the Souchez; Hénin-Liétard (population 3030), between Lens and Douay; Carvin-Epinoy (population 4254 town, 4962 whole commune), between Lens and Lille; Lillers (population 2319 town, 4891 whole commune), and St. Venant, on or near the Nave. Lens was once a place of strength, and was repeatedly taken in the wars of which Artois and Flanders were the seat; it is best known in history from the great victory obtained here (A.D. 1648) by the French, under the prince of Condé, over the Spaniards. The inhabitants distil potato spirit, and manufacture leather and soap. Clay is dug near the town. There is an hospital at Lens. At Hénin-Liétard oil is expressed and lawn manufactured. There are two fairs for cattle and hardwares. Lillers was once a place of strength, but the fortifications have been destroyed. It is agreeably situated in a fine plain, and has a handsome place or square, in which its two yearly fairs are held. The houses are for the most part well supplied with water by copious fountains on the premises. There are tanyards, breweries, oil-mills, and potteries, and some trade is carried on in linen yarn and linens. St. Venant, with a population of about 1000, is a fortified town in a low and swampy situation. It was taken by the allies under Marlborough and Eugene in 1710. The inhabitants are engaged in expressing oil, tanning, and brewing. There is one yearly fair. St. Venant has an hospital.

In the arrondissement of St. Omer are—St. Omer (population in 1831, 19,344; in 1836, 19,032) [Omer, St.] and Fauquemberg, on the Aa; Therouenne and Aire (population 8431 town, 9725 whole commune), on the Lys [Aire]; Tournehem and Audruick (population 2287), on or near the Hem, a small feeder of the Aa; and Ardres (population 2016) on the road from Calais to St. Omer. Fauquemberg, with a population of about 1000, has a considerable corn and cattle market. Therouenne, the Tarvenna of the Romans, was in the middle ages the capital of a county. It was taken from the French by Henry VIII. of England, A.D. 1513, but restored soon after, and again taken, A.D. 1553, by the emperor Charles V., who took revenge for the brave resistance of the townsmen by the destruction of the town. Ardres is a fortified town, but is very small. It was taken from the French by the Spaniards, A.D. 1596, but restored two years afterwards at the peace of Vervins.

In the arrondissement of St. Pol are—St. Pol (population in 1831, 3504; in 1836, 3452), on the Ternoise, an affluent of the Canche; Frévent (population 2071) and Vieil (or Old) Hesdin, on or near the Canche; Auxy or Auxi le-Château (population 2794), on the Authie; Pernes, on the Clarence; Aubigny, on the Scarpe; and Avesne-le-Comte, at the source of the Gy. St. Pol was in the middle ages the capital of a county. It was taken and retaken in the wars between François I. of France and the emperor Charles V., and finally ceded to France by the treaty of the Pyrenees (A.D. 1659). The town is pleasantly situated in a picturesque country: it has some remains of the antient fortifications, and of the castle of the counts of St. Pol. The inhabitants express oil, manufacture dimity and nankeen, and carry on trade in wheat, oats, hay, and some tobacco, which are grown in the neighbourhood. There are a subordinate court of justice, a high school, and one or two government fiscal offices. Frévent is a small but neat town, like a Flemish town. The townsmen are chiefly engaged in the wool trade. Vieil Hesdin, now a small place, was once of more consequence, but was destroyed by the emperor Charles V. Auxy le Château is in a marshy situation: the inhabitants manufacture some cotton yarn. At Aubigny cotton yarn and earthenware are manufactured. The village of Azincourt or Agincourt is in this arrondissement. [Agincourt.]

In the arrondissement of Boulogne are—Boulogne-sur-Mer (population in 1831, 20,856; in 1836, 25,732) [Boulogne], Ambleteuse, Wissant, and Calais (population 10,827) [Calais], on the sea; Guines (population 4279 town, [illegible] whole commune) near Calais; Samer, on the Liane; Desvres (population 2572 town, 2621 whole commune), Le Wast, and Licques, in the inland part of the arrondissement. Ambleteuse, a small town, with a port choked up with sand, was the place where James II. disembarked in his flight from England (A.D. 1689). Wissant, or Witsand, was probably the Itius Portus of Cæsar and other antient writers: the port is now choked with sand. Guines was in the middle ages a place of great strength, and the capital of a county. It was between Guines and Ardres that the celebrated interview of 'the field of the cloth of gold' took place between Henry VIII. of England and François I. of France, (A.D. 1520). The town, which is in a low marshy flat, where peat is dug, is now without fortifications. The townsmen trade in corn, cattle, poultry, and game. Samer is pleasantly situated on a hill; four streets meet in the market-place, which is large but irregular. The population is about 2000. Desvres is on the slope of a hill; the houses are built of stone, and there is a good market-place. Coarse woollen cloth, earthenware, and leather are manufactured. There are two yearly fairs.

In the arrondissement of Montreuil are—Montreuil (population in 1831, 4093; in 1836, 3867); Hesdin (population 3455), and Etaples (population 1764), on the Canche; Fruges (population 3085), near the head of the Lys; and Hucqueliers, near the head of the Aa. Montreuil was a place of strength in the middle ages, and was frequently besieged. Henri IV. augmented the fortifications, designing to make it a bulwark against the Spaniards, who then possessed Arras. It is still fortified; but the citadel, built on an eminence, is the only part which possesses any real strength. The principal street of the town is crooked but tolerably wide; all the houses are of brick. There are a subordinate court of justice, some government fiscal offices, a high school, a public library, an agricultural society, and two hospitals, one of them for foundlings. There are salt-refining houses, soap-houses, breweries, tanneries, rope-walks, and tile or other earthenware works. Linen cloth is made, and trade is carried on in groceries, wine, and brandy. There is one yearly fair. Montreuil is called Montreuil-sur-Mer, but is really 7 or 8 miles from the sea. Hesdin, in a marshy and unhealthy situation, is a place of some strength. It was built by the emperor Charles V., in place of Vieil Hesdin, which he had destroyed. It is defended by a wall, strengthened by bastions and considerable outworks. The ditches are always kept full by the Canche, which runs through the town. Hesdin is a neat place, with a church and a house of correction. The townsmen manufacture stockings, leather, soap, bricks, tiles, and earthenware, and express oil. There are three fairs, one held for a fortnight for horses, cattle, and agricultural produce. Good peat is dug near the town. Hesdin was ceded to the French by the treaty of the Pyrenees, A.D. 1659. Etaples, in the midst of sandy downs which line the coast, was formerly a place of strength, defended by a castle, now in ruins. It has now a salt-refining house, and some breweries and distilleries of corn-spirit. Snuff and salt are exported, and the herring and mackerel fisheries are actively carried on. At Fruges, ordinary woollen cloths and cotton and worsted stockings are manufactured; and trade is carried on in leather and shoes. There are two yearly fairs. Hucqueliers has two horse-fairs.

The manufactures of the department are very considerable: linen and cotton yarn and goods, woollen cloths and stuffs, lace, hosiery, paper, glass, gunpowder, starch, soap, clay-pipes, and other earthenware are manufactured; salt-refining, seed crushing for oil, brewing, distilling corn-spirit, tanning, brick and tile making, and the manufacture of beet-root sugar are carried on: the inhabitants of the coast are engaged in fishing.

The department constitutes the diocese of Arras, the bishop of which is a suffragan of the archbishop of Paris. It is in the jurisdiction of the Cour Royale of Douay, and in the circuit of the Académie Universitaire of that city. It is in the sixteenth military division, the head-quarters of which are at Lille. It returns eight members to the Chamber of Deputies. In respect of education it is considerably above the average of the French departments. Of the young men enrolled in the military census of 1828-9, 42 in every 100 could read and write, the average of France being little more than 39.

In the most antient period the country now forming this department was comprehended in the territories of the Ambiani, the Morini, and the Atrebates, three Belgic nations. The Ambiani occupied the southern part between the Authie and the Canche; the other tribes occupied the parts north of the Canche, the Morini on the sea-coast, and the Atrebates inland. All these nations joined the great Belgic confederacy against Cæsar, in the second year of his command in Gaul (B.C. 57). Upon the defeat of the confederacy, the Ambiani submitted; the others held out for a time; but the Atrebates, having shared in the great defeat sustained by the Nervii, were forced to yield, and were placed under the dominion of Commius, an Atrebatian and a friend of Cæsar; and the Morini, after assisting the Veneti in their naval struggle with the Romans (B.C. 56), for the most part submitted when Cæsar was in their country preparing for his first expedition into Britain (B.C. 55). They too were placed under the government of Commius. (Cæs., *De Bell. Gall.*, vii. 76.)

In the great revolt under Vercingetorix (B.C. 52) these nations all joined the Gallic confederacy, of which Commius was one of the chiefs. In the subsequent division of Gaul, the three nations were included in the province of Belgica Secunda. There were several Roman towns within the limits of the department. Taruenna, now Thérouenne, was the capital of the Morini; and Gesoriacum, afterwards Bononia, now Boulogne, and Itius or Iccius Portus, now Wit-sand or Wissant, also belonged to them. The *Portus ulterior* or *superior*, from which the transports with the cavalry sailed, on Cæsar's first expedition to Britain, was probably at or near Calais; and Marci mentioned in the 'Notitia Imperii' was perhaps Mark, between Calais and Gravelines. The Luttomagus, Adlullia, and Duroicoregum of the Theodosian or Peutinger Table, are fixed by conjecture at positions on the road from Bononia (Boulogne) to Samarobriva or Ambiani (Amiens), within the limits of the department. Duroicoregum, which belonged to the Ambiani, is supposed to be the modern Douriers on the Authie. The Teucera of the Theodosian Table, which was also in the territory of the Ambiani, may perhaps be fixed at Thièvre, on the Authie, near Pas. The only town of the Atrebates, known to have been within the limits of the department, was Nemetacum, their capital, afterwards called Atrebates, now Arras. Gesoriacum, or Bononia, was held by the usurper Carausius, from whom it was taken by Constantius Chlorus.

In the middle ages the department was divided between the provinces of Picardie and Artois. By far the greater part was included in Artois; a narrow strip along the coast formed the districts of Calais and Boulogne, or Le Calaisis and Le Boulonnois, and the part south of the Canche was included in the county of Ponthieu, all in Picardie. In the wars of the English kings Edward III. and Henry V., this part of France was the scene of contest. Edward III. besieged and took Calais (A.D. 1347), which, with the territory round it, remained in the power of the English, until it was retaken by the duke of Guise (A.D. 1558). The district of Calais was sometimes called from this circumstance Le Pays Reconquis. Henry V. fought the battle of Agincourt (A.D. 1415), when intercepted in his retreat to Calais. Boulogne was taken by Henry VIII. of England, A.D. 1544, and restored by Edward VI. (A.D. 1550). Boulogne was in 1803-4 the centre of the preparations made by Bonaparte for the invasion of England.

(Malte Brun, *Géographie Universelle*; *Dictionnaire Géographique Universelle*; Dupin, *Forces productives de la France*; Vayse de Villiers, *Itinéraire Descriptif, &c.*)

PASA'RGADÆ (sometimes written *Passargadæ*, and also, but only by Ptolemy and Solinus, *Pasargada*), an antient town of Persia, which is said to have been built by Cyrus after his victory over Astyages the Mede, which he gained near this place. (Strabo, xv. 730; Curt., v. 6.) The kings of Persia, according to Plutarch (*Artax.*), were consecrated at Pasargadæ by the Magi, and here was the tomb of Cyrus, of which Strabo (xv. 730) and Arrian (vi. 30) have given a description taken from the work of Aristobulus, who had visited the spot. According to their descriptions, the tomb was situated in a well-watered park, and was surrounded by numerous trees. The lower part of it, which was solid, was of a quadrangular shape, and above it was a chamber built of stone, with an entrance so very narrow that a man could with difficulty get into it. Aristobulus entered this chamber by command of Alexander, and found in it a golden couch, a table with cups upon it, a golden coffin, and many beautiful garments, swords, and chains. Aristobulus says the inscription on the tomb was, 'O man, I am Cyrus, who acquired sovereignty for the Persians, and was king of Asia. Do not then grudge me the monument.' There were certain Magi appointed to guard the tomb, who received every day a sheep and a certain quantity of wine and wheat, and also a horse every month as an offering to Cyrus. This tomb was plundered during the lifetime of Alexander by some robbers, who carried off everything except the couch and the coffin.

The position of Pasargadæ has been a subject of much dispute. Many writers think that Pasargadæ and Persepolis are only different names for the same place, and that the latter word is the Greek translation of the former. There appears however little doubt that they are distinct places. Strabo (xv. 729) speaks of them as such, and Arrian informs us that Alexander, in his return from Karmania, came to Pasargadæ in Persis, where he found the tomb of Cyrus plundered (vi. 29), and that thence he proceeded to the royal dwelling of the Persians (vi. 30), which must mean Persepolis. And again, in the beginning of the next book (vii. 1), he says, 'When Alexander came to Pasargadæ and Persepolis,' &c. Pliny (vi. 29) also speaks of 'Persæpolis' and 'Passagardæ' as distinct places, and says that the latter was to the east of a town called Laodicea, of the position of which we know nothing.

But although we may have strong grounds for believing that Pasargadæ and Persepolis are different places, it is difficult to determine the site of the former. Many modern writers have been disposed to place it in the plain of Murghab, about fifty miles north-east of Persepolis, in consequence of the remarks of Mr. Morier (*Journey in Persia*, p. 144) and Sir Robert K. Porter (*Travels*, vol. i. p. 498), who discovered a building in that plain, which they imagined to be the tomb of Cyrus. This building is called by the people of the country 'Kubr Maderi Suleiman,' or the tomb of the mother of Solomon; and the description given by Sir Robert K. Porter corresponds in many particulars to that of Arrian and Strabo. The tomb contains no inscription, but on a pillar in the neighbourhood there is a cuneiform inscription, which Grotefend, in an essay on this subject appended to Heeren's work on Asia (vol. ii., p. 360-75, Engl. transl.), interprets to mean 'Cyrus the king, ruler of the universe.' Saint-Martin however (*Journal Asiatique* for February, 1828) supposes that it rather refers to Artaxerxes Ochus; and Lassen, a most competent authority upon this subject, thinks that it is impossible to make out the name of Cyrus in the inscription. Hoeck (*Veteris Mediæ et Persiæ Monumenta*, Gött., 1818) thinks the building described by Morier and Porter to be the tomb of one of the Sassanian kings, the dynasty that ruled in Persia from the third to the middle of the seventh century of the Christian æra.

Lassen, who has examined the subject with great care and diligence (*Ersch und Gruber's Encyclop.*, art. 'Pasargadæ') thinks that we ought to look for Pasargadæ south-east of Persepolis, in the neighbourhood of Darabgherd or Fasa.

Herodotus does not speak of Pasargadæ as a place, but as the noblest of the Persian tribes (i. 125).

Stephanus of Byzantium says that Pasargadæ, or, as he writes it, Passargadæ, means the 'camp of the Persians;' but Lassen makes it mean 'the treasury of the Persians.'

PASCAL, BLAISE, a distinguished French philosopher, justly characterised by Bayle as 'one of the sublimest spirits in the world,' was born at Clermont in Auvergne, June 9, 1623. He was the only son of Etienne Pascal, president of the Court of Aids in that province, himself a learned and respectable man and able mathematician, who, when his boy had reached his eighth year, resigned his office and removed to Paris, for the purpose of watching over his education. From his childhood, Blaise displayed abilities far above the common order, and evinced so inquisitive a spirit that, as his sister has recorded, he would not rest without knowing the reason of everything. The bent of his infantine genius was decidedly mathematical; but his father, who was his only preceptor, and who was anxious that his attention should not be distracted from the study of the dead languages, resolved to exclude every notion of geometry from his mind, removed all books which treated of that science, and even abstained in the child's presence from any conversation on mathematical subjects with his friends. Notwithstanding these precautions however, young Blaise, when only in his twelfth year, without the aid of books or oral instruction, began to draw figures with charcoal on the floor of his room, and had, without any assistance, made some progress in geometry before his father surprised him in these researches.

After this discovery, he was thwarted no more in the pursuit of mathematical investigations; and at sixteen years of age he produced a treatise on the conic sections, of an-excellence as to provoke the incredulity and wonder of Des Cartes, who would not believe that so extraordinary a performance was the work of a mere youth. In his nineteenth year he invented an ingenious machine for making arithmetical calculations, which excited the admiration of his times; and, afterwards, at the age of twenty-four years the conjecture of Torricelli that the atmosphere had weight, and that this quality might account for effects before ascribed to the horror of a vacuum, led him to institute many able and successful experiments on this subject, which confirmed the truth of Torricelli's idea, and established his own scientific reputation. The results of these labours were collected into two essays, which appeared after his death, 'On the Equilibrium of Liquids,' and 'On the Weight of the Atmosphere.'

From these researches, made before he had completed his twenty-fifth year, the great mind of Pascal was diverted entirely to objects of religious contemplation; and thenceforward he abandoned almost entirely the pursuits of science. He had been all his life as remarkable for piety as for genius; and it is the testimony of a learned biographer, whose opinions were far from resembling his own, that he knew exactly how to distinguish between the rights of faith and of reason. The conviction of Pascal may therefore with propriety be cited among the most striking and satisfactory examples of the deep submission of the most powerful intellects to the truths of revelation; while it also may be considered with other illustrious exceptions to the reproach that the high cultivation of mathematical science is little favourable to piety. It is no fair objection to the value of his example, that Pascal, under the nervous excitation of bodily disease, fell into many absurd excesses of fanaticism; that he practised the most rigid abstinence from all worldly enjoyments, and wore next his skin a cincture of iron studded with points, which he struck with his elbow into his flesh, as a punishment to himself whenever any sinful thought obtruded itself into his mind. Such things may be ascribed to the inherent weakness of our corporeal nature, to some of the ordinary caprices of human disposition, or to the imaginative delusions attendant upon a particular state of bodily health; but they detract nothing from the soundness of the anterior investigation which had led a pure and unclouded reason like that of Pascal to embrace the doctrines of revelation, by a process analogous to that which had conducted him to the discovery of abstract truth.

It is a curious exemplification of the anomalous conditions of the human mind, that, while Pascal was immersed in these superstitious observances, he published his famous 'Provincial Letters,' in which, under the name of Louis de Montalte, he assailed the morality of the Jesuits with equal wit and argumentative acumen. He was induced to write this work by his adoption of the opinions of the Jansenists, which he warmly espoused, and which involved him in the religious disputes of his age and country. Among the fruits of his devotional exercises may also be named his 'Pensées,' which were collected and published after his death; and in which he has beautifully availed himself of an idea of one of the ancient fathers, that he who believes in the existence of a God gains eternally if he be right, and loses nothing if wrong; while the atheist gains nothing if right, and renders himself miserable eternally if he be wrong. The weakly frame of Pascal was reduced to premature old age by infirmities, which were aggravated by his ascetic habits, but which he bore with exemplary patience; and he died in Paris in 1662, at the age of thirty-nine years. His Life was written elaborately by his sister Madame Perier; and has afforded the materials for an able and interesting article in the Dictionary of Bayle.

PASCAGOULA, River. [MISSISSIPPI, RIVER.]

PASCHAL I. was elected bishop of Rome after the death of Stephen V., A.D. 817. To him the pretended donation by the emperor Louis the Pious is said to have been made. [PAPAL STATE.] He crowned as emperor Lothaire, son of Louis the Pious, in the year 823, and died the following year. He was succeeded by Eugenius II.

PASCHAL II., Ranieri of Bieda in Tuscany, was a monk of the order of Cluni. Having been sent to Rome about the affairs of his monastery, he was noticed by Pope Gregory VII., who made him a cardinal. After Gregory's death, and the short pontificate of Urban II., Paschal was elected pope. He refused the dignity, and even concealed himself, but was at last prevailed upon to accept the papal chair, A.D. 1099. He continued the great contest about the investitures, begun by Gregory VII. with the emperor Henry IV., against whom he launched a fresh bull of excommunication. Henry's son and namesake, availing himself of this, revolted against his father, and, having deposed him, was acknowledged as king of the Germans by the title of Henry V. He then proceeded to Italy with an army, in order to get himself crowned emperor. On the question of the investitures he was as stubborn as his father. After some conferences between him and the pope's ambassadors, Paschal proposed what appeared to be a reasonable compromise of the matter in dispute. 'If the emperor,' said he, 'contends for his royal rights, let him resume the donations on which those rights are founded, the duchies, margraviates, countships, towns, and manors, which his predecessors have bestowed on the Church. Let the Church retain only its tithes and the donations which it has received from private bounty. If Henry *renounces* the right of investiture, the Church shall restore all it has received from secular princes since the time of Charlemagne.' (Pagi, *Vita Paschalis II.*; Fleury, *Hist. Eccles.* &c.) This proposal went to the root of the evil, and Paschal was probably sincere in making it; but the bishops, and especially the German bishops, who were possessed of large fiefs, strongly protested against it. In the mean time Henry arrived at Rome to be crowned, A.D. 1110. He kissed the pope's feet according to custom, and entered hand in hand with him into the church of the Vatican. But here an explanation took place concerning the compromise, the result of which was that the treaty was broken off, and Paschal refused to consecrate the emperor. The particulars have been differently related by the various writers. Some say that Paschal could not fulfil his proposed renunciation of the temporalities of the Church, owing to the opposition of the bishops; others say that Henry would not give up the right of investiture, because his councillors, and among the rest several German bishops who were about his person, unwilling to risk their domains and revenues, persuaded him not to renounce what they represented as an essential part of the imperial prerogatives and of the splendour of the imperial dignity. After repeated messages between the pope and the emperor, the latter, who wished to be crowned at all events, determined to frighten the pope into compliance. At the suggestion, it is said, of two German prelates, one of whom was the archbishop of Mainz, he ordered his German soldiers to lay hands on the pope. A scuffle ensued, and the people of Rome, irritated at seeing their pontiff prisoner, fell on the German soldiers, and drove them back with considerable slaughter to their camp outside of the town. Henry however kept possession of the person of the pope, whom he dragged after him, stripped of his pontifical ornaments and bound with cords. Paschal remained for nearly two months in a state of confinement, during which he was assailed by the remonstrances of his clergy, many of whom were prisoners with him in the German camp, until at last he yielded to their entreaties, and consented to consecrate Henry unconditionally, giving up by a bull the right of investiture to the emperor. After the *ceremony*, Henry returned to Germany, and Paschal thought it necessary to assemble a council in the Lateran to submit his conduct to the judgment of the Church. He declared to them at the same time that he would rather abdicate than break his word to the emperor, either by excommunicating or molesting him. After much deliberation, Paschal's *cession* of the right of investiture was solemnly condemned, and it was declared that the investiture of churchmen by lay hands was a heresy. The prelates of France and Italy, and even some of those of Germany, approved of the proceedings of the Lateran Council, and several of the turbulent German feudatories revolted against Henry. The emperor however kept the field, and, having defeated his revolted subjects, marched again to Italy to terminate the question with the see of Rome. Paschal, blamed and even personally insulted by the Romans because of his indulgence towards Henry, and threatened at the same time by the latter, escaped to Benevento, and Henry, having come to Rome, caused himself to be crowned again by the bishop of Benevento. After his departure, Paschal returned to Rome, but soon fell ill of fatigue and anxiety, and died in January, 1118, after a most stormy pontificate of eighteen years. He was succeeded by Gelasius II. The question of the investiture was settled by a compromise, in 1122, under Calixtus II., the successor of Gelasius. It was agreed that the bishops, being elected according to the canonical forms, should receive their regalia at the hand of the emperor and do homage for them, but that in this ceremony the emperor should no longer use the ring and crosier, the insignia of spiritual authority, but the sceptre only. Thus terminated a quarrel which had occasioned so much violence and bloodshed for half a century.

PASCHAL III., Antipope, was elected by the influence of the emperor Frederic I., in opposition to Alexander III., A.D. 1165. He took possession of Rome for a short time, Alexander being obliged to escape to Benevento, but he died shortly after, A.D. 1168. [ALEXANDER III.]

PASCHA'LE CHRO'NICON. [BYZANTINE HISTORIANS, p. 82.]

PA'SHA or **BASHA**, a Turkish appellation for a man in high command, such as the great officers of the Porte, the governors of provinces, and the high admiral, who is called Capudan Pasha. The provinces administered by Pashas are called Pashaliks. The Turks often write the word Pashah with an h at the end, as if it were a contraction or corruption of the Persian word Padishah, which is a compound of Pad, 'a guardian,' and Shah, 'king,' and which is the title assumed by the Ottoman Sultan, the king of Persia, the Mogul, and other great Eastern potentates. (Herbelot, *Bibliothèque Orientale.*) Some derive Pasha from the Persian Paï Shah, 'the foot of the king,' because those officers tread in the steps of the sovereign and stand in his place. (*Continuation* to D'Herbelot, vol. iv., 4to. edition, 1779.)

PASI'THEA, a genus established by Mr. Lea for some pyramidal shells allied to *Melania*, and placed by him in the family *Melaniana*, found fossil in the tertiary beds at Claiborne, Alabama. (Marine.)

Generic Character.—Shell turrited, sometimes umbilicate; mouth entire, angular above, somewhat effuse at the base; columella smooth, thickened.

Differs from *Rissoa* in having the mouth acutely angular above, and not thickened into a varix. (*Contributions to Geology*, 1833.)

Mr. Totten has described a recent species from the shores of Rhode Island. Operculum horny. (Sill., *Journ.*, vol. xxvi.)

PASITI'GRIS. [TIGRIS.]

PA'SPALUM, so called from one of the Greek names for Millet, is a genus of grasses, which, like some species of Panicum, forms one of the small grains cultivated in tropical countries as food for the poorer classes of the community. The genus is characterised in habit by having a continuous spiked rachis, on one side of which the spikelets are attached. The glume is 2-valved, 1-flowered, closely pressed to the two plane converse paleæ. Seed adhering to the paleæ.

P. scrobiculatum is the *Koda* of the natives of India, and is cultivated by them over almost all parts of India, as it is one of the crops cultivated in the rainy season, when there is great equality of temperature over the whole country. It delights in a light, dry, loose soil, but will grow in a very barren one. The seed is an article of diet with the Hindus, particularly with those who inhabit the mountainous parts of the peninsula, as well as in the most northern parts of the country, or where the soil is barren and unsuited to the cultivation of those grains which are more beneficial. Dr. Roxburgh states that the boiled grain is as palatable as rice. He distinguishes from this another species, which Linnæus called Paspalum Kora, but it appears to be only a variety growing in moist situations. Both species are much relished by cattle either in a green or dry state.

PASQUE FLOWER, or **PASCHAL FLOWER**, so named in consequence of its usually flowering about Easter, is the Anemone pulsatilla of botanists, a little herbaceous plant, with finely-cut leaves, and nodding dull deep purple flowers. It is occasionally met with in the chalky pastures of England, as on the Gogmagog Hills and elsewhere in Cambridgeshire.

PASQUIE'R, ETIENNE, born at Paris in 1529, studied the law under Hotoman, Balduin, Cujas, and other celebrated jurists of that age. After the completion of his studies, it was several years before he could get into practice. In 1564, when the great suit between the Jesuits and the University was brought before the parliament of s, Pasquier was entrusted with the management of the on behalf of the University. [JESUITS.] He made a ant speech, which was printed and translated into various ages, and established his reputation. (*Histoire du Parlement de Paris*, c. 26.) In 1585, Henri III. made Pasquier advocate-general to the Chambre des Comptes. In 1588 he was named deputy to the states-general of Blois, and there he witnessed the murder of the Duke of Guise, which he relates impartially in his letters. When Henry III. was obliged to leave Paris in possession of the League, Pasquier followed him to Tours. His sons were at that time fighting in the king's army, and one of them was killed. After the surrender of Paris to Henri IV., in 1594, Pasquier continued in his office of advocate-general, till 1603, when he resigned, and passed the rest of his life in studious retirement. He died at Paris, in 1615. His works were published in two volumes fol., 'Œuvres d'Etienne Pasquier,' Amsterdam, 1723. They consist of his 'Recherches sur la France,' which is an interesting work, and of his 'Lettres.' The first book of the 'Recherches' treats of the Gauls and their subjugation by the Romans, the invasions of the Franks, the Goths, and the Normans, the origin of the Bretons and the Gascons, and the formation of the Frankish monarchy. The second book treats of the old institutions of the French, of the feudal nobility, the peers, the maires of the palace, the parliaments, &c. The third book relates to the Catholic church, to the bishop of Rome and his gradual assumption of supremacy and of the title of 'pope,' the various conflicts between the see of Rome and the Gallican church, the abuses introduced into the church, the tithes, the benefices, and lastly the 'sect of the Jesuits,' as Pasquier calls it, and here he inserts his 'plaidoyer' against that order. The fourth book treats of the laws and judicial customs of the monarchy. The fifth book consists of remarks on the history of Clovis and his descendants of the first dynasty. The author undertakes the defence of Brunehault against the imputations of the chroniclers. [BRUNEHAULT.] The sixth book relates to the establishment of the third or Capetian dynasty and the history of its kings, their wars both at home and abroad, with some marvellous anecdotes, in relating which the writer shows considerable credulity and want of critical discrimination, which however are not surprising in his age. The seventh book treats of French poetry; and the eighth book, of the origin of the French language, with explanations of many peculiar words and idioms. The ninth book is on the universities and other scientific institutions of France, the introduction of the Roman law, and its prevalence over the 'droit coutumier,' or old prescriptive usages of the country, of which Pasquier shows himself a warm defender, alleging that they were more favourable to the liberties of the nation than the Roman law, which, having emanated from the absolute power of the emperors, was not in accordance with the spirit of the limited monarchy of France; and he presses his views upon several of his brother councillors in some of his letters, and especially in one to Brisson. Pasquier's letters are arranged in 22 books, and relate to multifarious subjects of law, literature, contemporary history, and private life.

Pasquier is an authority of considerable weight in matters relative to the civil history of the old French monarchy before it was converted into a despotism, and the information which he collected has been very useful to subsequent writers. He wrote also poetry, both French and Latin, which has long since been forgotten.

PASQUIN, the name given to a mutilated antient statue which stood at the corner of the palace Santobuono, in a small open place in the city of Rome, near the Piazza Navona. It represents a warrior in the attitude of defence. The subject of the statue is not known. Pasquino was the name of a tailor who lived in that neighbourhood 'many years since,' says Parisio, in his *Antiquities of Rome*, published A.D. 1600. The shop of Pasquino was a sort of place of meeting for the people of the district, who came there to tell or hear the news of the day, as is still the custom in the apothecaries' shops in the provincial towns of Italy. The tailor was a facetious man, and his witty sayings were styled 'Pasquinate,' which afterwards became a common appellation for humourous epigrams and sarcastic lampoons, a kind of composition for which the modern Romans are noted. These lampoons, which often attacked people in high stations and the government itself, were fixed in the night on or near the statue already mentioned; and thus the statue itself came to be called Pasquino, as being the representative of the witty tailor of that name. Collections of these epigrams have been made, and some of them very witty, though often scurrilous and coarse.

PASSAMAQUODDY BAY. [NEW BRUNSWICK.]

PASSAU, the capital of the Bavarian circle of the Lower Danube, is situated at the conflux of the Danube and the Inn, in 48° 34′ N. lat. and 13° 25′ E. long. It consists of the town itself and of three suburbs. The town lies on the peninsula between the two rivers. A handsome bridge, resting on seven piers of granite, crosses the Danube, which is 754 feet wide. On the right bank of the Inn, which is 600 feet wide, is the suburb called the Innstadt, connected with the town by a wooden bridge. On the other side of the Danube, and on the left bank of the Ilz, which there also falls into the Danube, lies the Ilzstadt. The third suburb of Passau is called the Anger. In the angle between the right bank of the Ilz and the Danube there is a rock 390 feet high, upon which stands the fortress of Oberhaus, which is connected with the castle of Niederhaus, situated below it, and surrounded by eight forts. The town of Passau itself is pretty well built; among the public buildings the most remarkable are the palace, formerly the residence of the bishop, the lyceum, formerly a Jesuits' college, the fine cathedral, built of hewn stone, a gymnasium, and an ecclesiastical seminary. There is a military swimming school. In the Domplatz (the cathedral square), the handsomest square in the town, stands the colossal bronze statue of king Maximilian Joseph, erected in 1824, by the inhabitants of the circle of the Lower Danube. The charitable institutions of Passau possess a capital of two millions of florins. There are a great tobacco and snuff manufactory, extensive breweries, tanneries, and paper mills. Passau is the staple town of Bavaria for salt; there are great magazines, to which the salt is brought from the works of Hallein. The inhabitants carry on a considerable trade on the Danube.

In 1552 the Convention of Passau was concluded here, by which complete religious liberty was secured to the Protestants of Germany. Not far from Passau is the Mariahilf Berg, with a chapel, which is a celebrated place of pilgrimage. The bridge over the [illegible], near Passau, is considered a curiosity, being one arch of 200 feet span, the largest in Germany.

Passau was formerly the capital of a bishopric, which was founded in the seventh century, but was secularised in 1803, and in 1805 wholly incorporated with Bavaria. The population is now stated at 10,560, of whom about 7000 live in the town itself.

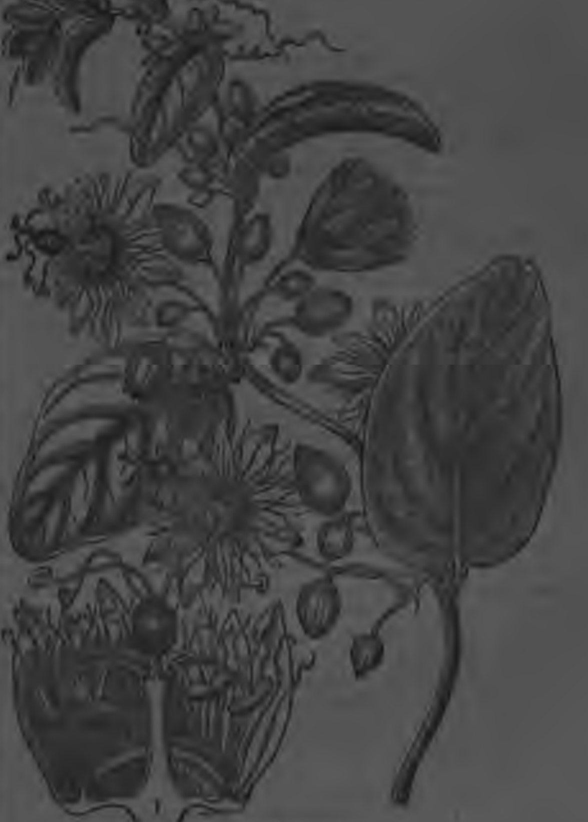
PASSERELLA, Mr. Swainson's name for a subgenus of *Fringilla*, and thus characterised by him:—*Bill* short and perfectly conic, thick at the base, and rather abruptly pointed at the tip, which is entire. *Culmen perfectly straight.* Both mandibles of equal thickness. *Wings* moderate; the first quill shorter than the second, third, and fourth, which are the longest. *Tail* moderate, broad, and nearly even. *Feet* large, strong. *Middle toe longer than the tarsus; inner toe much shorter than the outer.* Claws long, slender, and but slightly curved; hinder claw as long as the toe. America.

Example, *Passerella iliaca*. (Wils., iii., 22, f. 4.)

PASSERITA, Mr. Gray's name for a genus of serpents, *Dryinus* of Merrem.

PASSERONI, GIAN CARLO, born in 1713, at Condamine, in the county of Nizza, studied at Milan in the Jesuits' college, and afterwards took orders as a priest. He went to Rome with the papal nuncio, and afterwards returned to Milan, where he spent the rest of his life in a state of poverty often bordering upon destitution. But he was so used to be content with little, that he felt no uneasiness from his condition, and constantly refused the offers of his numerous Milanese friends to relieve his wants. Passeroni was fond of study, and especially of poetry, and he had a great share in reforming the taste of the Italian writers of his age. Parini, who, in his youth was intimate with Passeroni, afterwards admitted that to his precepts and example he owed the formation of his own style. The principal work of Passeroni is a half burlesque, half moral poem, styled 'Il Cicerone,' in 101 cantos. It is full of digressions, something similar in manner to Sterne's 'Tristram Shandy,' but Passeroni's digressions are clearly intelligible, and have all a moral scope. A kind of parody of Cicero's life is used by the author as a thread whereon to hang his digressions. Passeroni ridicules or reproves the numerous follies and vices of society in a good-humoured and often very amusing strain, and his verses, like those of Ovid, seem to flow naturally and without effort from his genius and facility, and the unaffected simplicity of the style constitute the principal charm of the poem. Passeroni wrote also seven volumes of fables in verse, chiefly imitations of those of Æsop, Phædrus, and Avienus. He died at Milan, in 1803. (Ugoni, *Della Letteratura Italiana*.)

PASSIFLORA, or **PASSION-FLOWER**, is a genus of twining plants, whose name is derived from a fancied resemblance between the parts of their flower and the emblems of our Saviour's crucifixion. In the five anthers the Spanish monks saw his wounds, in the triple style the three nails by which he was fixed to the cross, and in the column on which the ovary is elevated, the pillar to which he was bound; a number of fleshy threads which spread from a cup within the flower, were finally likened to the crown of thorns. 'There are cuts,' says Sir James Smith, 'to be found in some old books, apparently drawn from description, like the hog in armour upon our signs to represent the rhinoceros, in which the flower is made up of the very things themselves.' In reality the flower of Passiflora consists of a calyx and corolla, each of five divisions, consolidated into a cup, from within the rim of which spread several rows of filamentous processes, by some regarded as barren stamens; within these, from the sides of the cup, there proceed one or more elevated rings, notched or undivided, and in various degrees of development in different species, and evidently of the same nature as the filamentous processes themselves. In the centre of the flower stands a column, or gynophore, with the sides of which five stamens are united, but spread freely from it beyond its apex, and bear five oblong horizontal anthers. At the apex of the column is the ovary, a one-celled case, with three parietal polyspermous placentæ, and bearing three club-shaped styles at its vertex. Eventually a gourd-like fruit is produced containing many seeds, each having its own fleshy aril, and usually enveloped in a subacid mucilage.



Passiflora [illegible]

1, a flower cut open vertically, so as to show the calyx, corolla, filamentous crown, interior rings, stalked gynophore, stamens, and ovary.

The genus comprehends a large number of species, chiefly found in a wild state in America, and within or near the tropical parts of that continent. They are all twining plants, often scrambling over trees to a considerable length, and in many cases are most beautiful objects on account of their large gaily or richly coloured flowers. This makes them favourites in gardens, where many are cultivated, particularly the P. alata, quadrangularis, edulis, cœrulea, racemosa, Loudoni, onychina, palmata, and filamentosa, all which are strikingly handsome. It is however chiefly for their fruit that they are valued in the countries where they grow wild, in consequence of the pulp which envelopes the seeds being cool and refreshing, with something of a fragrant bouquet. Under the name of Granadilla the P. quadrangularis is well known in Brazil, where its fruit is as large as a child's head; the water-lemon of the West Indies is the produce of P. laurifolia; P. maliformis bears what is called the sweet calabash; and the pleasant pulp of P. edulis furnishes the confectioner with the most delicate material for the flavouring of ices. Many however are of no value for their fruit, and some are actually fœtid.

The Passion-flower serves as the type of the natural order PASSIFLORACEÆ, of which indeed it constitutes the principal part. This collection of genera is very closely allied to the Cucurbitaceous order, but is distinguishable by its peculiar filamentous crown, and by its superior ovary, exclusive of all other marks. In both cases a few plants are not climbers, and have a dry, not succulent, fruit. The sensible properties of the order are usually too feeble to be appreciable; but when concentrated, as in Passiflora rubra, called 'Dutchman's laudanum,' P. fœtida, and a few others, they are found to be narcotic.

PASSIONE'I, DOME'NICO, born in 1682, at Fossombrone in the duchy of Urbino, studied at Rome, after which he received holy orders, and was employed in several offices under the papal court. He also distinguished himself in classical learning and the study of antiquities, and collected a valuable library of scarce works and MSS. He was a correspondent of Montfaucon and other learned men of his age. In 1706 he was sent by the pope to France, and from thence he proceeded to Holland, where he resided some time. He was appointed papal nuncio to the Congress of Utrecht in 1712, and afterwards to the Congress of Baden in 1714. On his return to Rome from these missions, he resumed his favourite studies, but in 1721 was sent by Innocent XIII. as nuncio to the Helvetic Confederation: he resided in that capacity at Luzern till 1729, when he proceeded as nuncio to Vienna. Passionei wrote a journal of his Swiss mission, entitled 'Acta Apostolicæ Legationis in Helvetia,' 4to., Zürich, 1729. He returned from Vienna in 1738, and was made 'secretary for the briefs' and a cardinal, with the title of archbishop of Ephesus. He was also appointed a member of the Congregation de Propaganda Fidei. Notwithstanding all these duties, he found time to pursue his favourite studies and to keep up an extensive correspondence with Maupertuis, Eckardt, Ruinart, Gronovius, Bianchini, and other learned contemporaries. He had a country-house at Frascati, where he formed a museum. His nephew, Benedetto Passionei, published the inscriptions in this collection, 'Iscrizioni Antiche con Annotazioni,' fol., Lucca, 1765. In 1755 Cardinal Passionei was made librarian of the Vatican. He died at Frascati, in 1761. Passionei was a member of most Italian academies and also of that of 'the Inscriptions' at Paris. He was a great favourite with Pope Benedict XIV., with whom however he had frequent altercations, being very tenacious of his opinions and not at all courtly disposed. He was particularly hostile to the Jesuits, and was very careful not to admit any of their works into his library. His books were purchased after his death by the Augustin monastery, and added to their fine library, which is styled the 'Angelica,' and is one of the principal public libraries at Rome. Passionei revised, together with Fontanini, the 'Liber Diurnus Pontificum,' edited several other works, and wrote in Italian a funeral panegyric on Prince Eugene. He was a great promoter of learning, and one of the most distinguished prelates of the church of Rome in the last century.

(Galletti, *Memorie per servire alla Storia della Vita del Cardinal Passionei*, Rome, 1762.)

PASSIVE VOICE. [MIDDLE VOICE.]

PASSOVER (פֶּסַח, *a passing over*, or *sparing*, *πάσχα*), also called the feast of unleavened bread, one of the three great annual festivals of the Jews, was established to commemorate God's passing over the houses of the Israelites in Egypt when he slew the first-born of the Egyptians (*Exod.* xii. 27). It was first observed in Egypt on the night before the Exodus. It began on the evening after the 14th day of the month Abib, or Nisan, which was the first month of the sacred year, and lasted seven days, the first and last of which were observed as especially holy by abstinence from all labour, and by a convocation of the people for worship. After the settlement of the Israelites in Palestine, it was incumbent on all their males to go up to the Temple to keep this feast. The following were the ceremonies observed in its celebration:—A lamb, or kid, a male of the first year, without blemish, was selected by each household (or if the households were small, by two conjointly) on the 10th day of the month, and it was kept till the 14th day of the month, when it was killed in the evening (literally, 'between the two evenings,' an expression which is variously interpreted), and roasted, and eaten with unleavened bread and bitter herbs. None of it was to be left till the next day. that was not eaten was to be burnt. They were to eat in haste, standing, with their loins girt, their shoes on their feet, and their staves in their hands, as those prepared for a journey. None, whether Israelites or strangers, were to partake of it unless they had been circumcised. Not a bone of the paschal lamb was to be broken, and all of it was to be eaten in the same house. When the lamb was killed its blood was sprinkled with a bunch of hyssop on the lintel and door-posts of the houses, which was intended, in the original institution of the feast, as a sign to distinguish the houses of the Israelites from those of the Egyptians, and no one was to go out of doors till the morning.

During the seven days for which the feast lasted nothing but unleavened bread was to be eaten, on penalty of being cut off from the people. Sacrifices were appointed to be offered on each of the seven days (*Numb.* xxviii. 17…). On the second day of the feast a sheaf of corn was to be brought, as the first-fruits of the harvest, and the priest was to wave it before the Lord (*Levit.* xxiii. 10; Joseph., Ant. iii. 10, 5).

The word passover is used not only for the feast, but also repeatedly for the paschal lamb itself.

This institution was typical of the death of Christ for the salvation of his people (1 *Cor.* v. 7).

(Winer's *Biblisches Realwörterbuch*, under 'Pascha;' Lightfoot's *Temple Service*, c. 12.)

PASSPORT, a printed permission signed by the secretary of state of the home department of a country, which allows a subject of that country to leave it and go abroad. When he has obtained this, the bearer must have his passport signed by the minister or agent of the state to which he intends to proceed. A foreigner who wishes to leave the country where he has been residing, generally obtains a passport from the minister or agent or consul of his own state. Such a document states the name, surname, age, and profession of the bearer, and serves as a voucher of his character and nation, and entitles him to the protection of the authorities of other countries through which he may pass, and which are at peace with his own. On arriving at the outports or frontier towns of a foreign state, every traveller is obliged to show his passport, which is examined by the proper authorities before he is allowed to proceed on his journey. This ceremony is sometimes repeated at every garrison town which he passes on the road. Even the natives of most European states cannot travel twenty miles through their own country without being furnished with a passport.

The system of passports is old, but it has become much more rigid and vexatious during the last half century. The only civilised countries in which passports are not required are the British Islands and the United States of North America; and the natives of those two countries, accustomed to the freedom of unobstructed locomotion, find the regulations as to passports when they travel on the continent of Europe to be rather irksome. The practice has been defended on the plea that it prevents improper and dangerous persons from introducing or concealing themselves; but numerous instances have proved that persons, however obnoxious, who have money and friends, can evade such restrictions. That every state may admit or refuse admittance to foreigners as it thinks fit, cannot be questioned; and in times of war especially, some sort of restriction may be required for the safety of the country; but the present vexatious system of passports, as enforced in many European states in time of profound peace, is both illiberal and puerile. It is a tax upon travellers, to whom it causes much trouble and loss of time, while the advantages supposed to result from it are at least very dubious. It has been compared to spiders' webs, in which flies are caught, but which larger insects or birds easily carry off along with them. In Turkey a passport is called a FIRMAUN.

PASTES. [GLASS, p. [illegible].]

PASTO. [GRANADA, NEW.]

PASTOR (Ornithology). [STURNIDÆ.]

PASTORAL (from the Latin *pastor*, a shepherd or herdsman), is the name given to poems which are descriptive of the pursuits of country life, or to dramas in which the characters represent shepherds or other country-people. [BUCOLICS; IDYLL.]

Pastoral letters are circulars addressed by a bishop to his diocesans for purposes of religious instruction or admonition in matters of discipline. This name also is derived from 'pastor,' the bishop being styled the shepherd of his spiritual flock.

PASTURE LAND. There are tribes which have no other occupation than that of pasturing domestic animals, and immense tracts of fertile soil are still unappropriated to any definite owner. Where the climate is genial, and the extremes of heat and cold are unknown, cattle are fed all the year round by moving from one place to another. In such a state are some of the wandering tribes of Asia, who have no fixed habitations, but pitch their tents wherever pasture is abundant, and move them to another spot as soon as it is consumed where they are. In civilised countries, where the land is divided and appropriated, such a system cannot exist; though there are still traces of it in this country, as we see in the few remaining waste lands, on which there is a right of common.

The pasturage of cattle is now a part of regular husbandry; the land which affords the herbage for cattle forms part of private possessions, and a rent is paid for its use. This has introduced a new system. Pastures are now fenced and protected, and pains are taken to improve them, so as to maintain many more cattle or sheep than they would in their natural state. We shall not here speak of rich grass lands, in which bullocks and sheep are fatted, and which are commonly called grazing land: nor of artificial pastures, which form portions of arable farms, and have been depastured only to enrich them and make them more fit to produce corn when again submitted to the plough. But we shall consider those tracts of land which, from situation, climate, or other causes, although they are portions of certain estates and the property of individuals, lie nearly in a state of nature, and produce a revenue or profit only according to the number of cattle and sheep which can be reared or maintained in them. Such are the rich pastures on the Jura, the Alps, and Pyrenees, too high and exposed to allow of cultivation or permanent habitation, but producing abundant food for cattle in particular seasons of the year. The Jura and the Alps, which are best known to English travellers, contain very rich pastures for cows, and give a considerable return in butter and cheese. The snow which covers these mountains for a considerable part of the year, protects the herbage; and the moisture which prevails in the summer by the continued passage of clouds, which appear in the form of heavy fogs to those who are enveloped in them, keeps up a luxuriant vegetation of the small Alpine plants which form the richest pasture.

Whenever pastures are hired, the rent is always reckoned, not by the extent of surface, but by the stock which can be maintained upon it. Thus, in Switzerland, the mountain pastures are divided into portions of 20, 40, or more cows. In Scotland they reckon sometimes by the number of bullocks which can be reared, and sometimes by the number of sheep which can be kept. This mode of reckoning is much fairer than by mere extent of surface. In many places pasturing has been found much more productive than cultivation; and some large proprietors have converted great tracts of land from arable into pasture farms. But this can only be done where the population is very scanty, and where the soil and climate do not tempt men of capital to settle.

Considerable improvements have been made in natural pastures, not only by the raising of banks and stone walls as shelter against the winter's storms, but also by extensive draining and clearing the surface of wild plants and shrubs, which prevent the herbage from springing up, and greatly diminish the food. On the sides of steep hills, where springs are apt to break out and produce bogs and swamps, drains judiciously made have carried off the water and laid dry the pastures below them; while reservoirs have been constructed in many places to receive the water and to supply the stock in dry weather. On peaty moors the application of lime to the surface has often produced wonderful effects, and made various kinds of clover and grasses spring up which were never seen on the spot before.

Those who are possessed of extensive pastures often look upon them as of too little value to lay out any money in their improvement; and unless when an attempt is made to bring them into regular cultivation, which often fails after a great outlay of money, they are not thought worth any attention. Yet many rough hilly pastures might be doubled and tripled in value merely by clearing the surface, burning coarse grasses, rushes, ferns, and furze; and sowing a few seeds where the ashes have been spread. The additional number of cattle or sheep which can be maintained by this means, would surprise any one who had not had experience of such improvements. The forming of convenient channels for the water to run off is another important object, which can often be effected at a trifling expense; and a loose surface laid dry by this means may be much improved, by merely burning the heath which grows upon it. After the fire has scorched the ground, grasses will spring up spontaneously; and, at a very small expense, a considerable tract of mountain pasture may be converted from the state of a brown heath or moor to that of a fine green sward.

Wherever there are large pastures, proper and suitable buildings made of substantial materials should be erected. The cattle should have numerous sheds for refuge in bad weather, and sheep especially should have protection and shelter. Warmth is in some cases of more importance than food; and an animal exposed to all the severities of a northern climate requires more food to keep him alive, than when he is kept warm and protected from the immediate influence of cutting winds.

There is another kind of pasture in England on the chalky hills which are called downs, where useful and hardy sheep are reared. Here the exposure is less, and the proximity to the plains gives frequent opportunity of driving the sheep to sheltered situations. The grass on the chalk hills is in general very fine and short, and the quality is very good. The soil is only a few inches deep, but it has been enriched by the dung and urine of sheep from time immemorial. Attempts are made occasionally to convert some portions of these pastures to tillage: but it is not often an advantageous speculation. A few crops may be obtained at first; but the thin layer of rich earth, which is at the surface, is soon exhausted, and nothing remains but barren chalk. No art can restore the fine turf which had been produced by ages of pasturage.

To those who have extensive pastures it is of great consequence to ascertain whether oxen, heifers, cows, or sheep are the most profitable, and of these, what breeds suit the situations; and, when this has been determined by experience, to know what quantity may safely be kept, without suffering for want of sufficient food, or allowing any portion of the pasture to wither or become coarse from not being duly fed off. Whatever be the stock depastured, the greatest attention should be paid to them by a herdsman or shepherd of experience, who should have a certain number only under his care. It is a good plan to give him some share or interest in the produce as part of his wages. When any part of the stock is sold off to drovers or butchers, he should have a per centage on the sale. This will give him the activity of an owner, and he is not so likely to be negligent and allow the stock to suffer from a want of sufficient food, or from accidents which can be prevented by proper attention.

Very poor pasture on sandy or gravelly loams is of very little value to the proprietor; where the situation allows of such land being converted into plantations, it will generally be found most advantageous to do so, but if there are means of improving them by ploughing, liming, and manuring, they may often be converted into good arable farms. A great part of Norfolk, which now bears excellent crops of barley, wheat, and clover, was once only poor sandy pasture, where the chief income to the proprietor arose from rabbit warrens. We must not always judge of the capabilities of a soil by the natural grasses which grow upon it, before it has ever been stirred and cultivated. When loamy sand or gravel is left in a hard condensed state, it will bear very little, but when it has been broken up deep, and trenched and improved by lime and manure, it becomes very useful land. The same may be said of cold wet pastures on a stiff clay. The water checks the roots of the better sort of grasses, and nothing thrives in such pastures except rushes and very coarse aquatic plants; but when they have been carefully drained—when the surface has been pared and burnt, and the ashes spread over the land—a very material improvement takes place, whether it be left unbroken, to produce herbage, or be improved by a course of judicious cultivation, and laid down again to grass in a clean and fertile state; in either case, the pasture, from being of little use, and perhaps dangerous for sheep, which are apt to rot there, becomes sound and good, producing excellent nutritious herbage, and will continue so ever after.

When the soil is naturally deep and of a good quality, but the situation renders it not advisable to convert the pastures into permanent arable land, and the herbage has been deteriorated and overrun with moss or weeds, it is a very effective mode of improving the pasture to plough up the sward as thin as possible, and then, having removed the sods into heaps or rows, to plough and scarify the bared surface to the depth of four or five inches, so as to give it the appearance of a fallow field. When it is well pulverised and harrowed level, the sod, which had been taken off, is chopped into small pieces by the spade, and scattered over it; and after a shower has somewhat moistened the surface, it is well rolled with a heavy roller. Thus the moss is effectually destroyed: the root-weeds have been eradicated, and the fine grasses, the roots of which are short and fibrous, are preserved. They will soon strike into the loosened soil, and a fine close sward will be the result. The improvement is still greater if lime is put on the land before the spreading of the sods, and if at the same time some of the best grass seeds are sown over it. The proper season for this operation is after harvest, and no cattle should be admitted till the next spring.

Pastures are seldom improved with manure, which is generally reserved for arable land, or grass land intended to be mown for hay: but if richness is valuable in a pasture, it will well repay the expense of manuring, especially with liquid manure, the drainings of dunghills and the urine of cows and horses, which is collected in a tank when they are kept in stalls. Peat ashes are also very useful, and have a powerful effect in stimulating the vegetation of all the grasses. Saltpetre and nitrate of soda are said to have the same effect. When it is intended to convert land which has been in a state of heath or waste, covered with fern, brambles, ling, and other coarse plants, into good pasture, it is indispensable to begin by a course of arable cultivation; and it is only when the soil has been brought into an improved state by tillage and manuring, and all the roots and seeds of noxious plants have been eradicated, that grass seeds may be sown with any prospect of obtaining a good sward. Most of these soils are poor and sandy, and not very favourable to the growth of good grass. In this case the safest mode of converting the land into pasture is by inoculating it with pieces of sods taken from a good rich pasture. [GRASS LAND.] By this means, and subsequent depasturing with sheep only, very good pastures have been produced on very poor soils; and if in the course of a few years they should degenerate, they may be profitably broken up and cultivated on the convertible system of husbandry, after which they may again be laid down for a certain number of years. Wherever the soil consists of a sandy or gravelly loam, this system is the most advantageous.

In the richest pastures, such as those of Lincolnshire and other grazing counties, an acre will maintain and fatten an ox of 80 or 90 stone, and sometimes keep several sheep in store order besides. There is a marked difference between land that will fatten an ox, and that which will only rear him. This can scarcely be discovered by simple examination of the land; but is found by experience. The same appearance of grass has more *proof*, as it is called, in one place than another. The bite may be very short and the pasture appear bare, and yet the value of it may be seen on the ribs of the cattle. Much of the skill of a grazier consists in stocking his pastures to advantage. He should know the power of every portion of it, and stock it so that the grass may not grow faster than it can be cropped by the cattle or sheep, and that the animals may always have the full quantity required. Every animal wants a certain quantity of food to repair the daily waste occasioned by the animal functions. If he has no more, he makes no progress: the more he can convert into flesh and fat beyond this quantity in a given time, the more profitable he will be. Hence the superior qualities of some animals with respect to this point indicate the superiority of their breed, and afford the greatest net profit to the grazier. In the same pasture one beast or sheep will give a reasonable profit, while another may occasion an actual loss. The adaptation of the stock to the nature of the pasture is consequently an object of the greatest importance, and requires much judgment and experience.

PASYTHEA, the name given by Lamouroux to a group of Linnean Sertularidæ. [POLYPIARIA MEMBRANACEA.]

PATAGONIA, a country in South America, comprehending the most southern portion of that continent. It includes all those parts in which the Europeans have not formed settlements, or to which they do not lay claim. A few years ago the state of Buenos Ayres extended its settlements to the Bahia Blanca (39° S. lat.), and the federal government of the provinces of La Plata has fixed the southern boundary of the federal republic on the banks of the Cusu Leubu, or Rio Negro. This river therefore must now be considered as the dividing line between Patagonia and the provinces of La Plata, though a great extent of country north of that river is still the undisputed abode of wandering aboriginal tribes. From this new boundary, the most northern point of which is near 38° 50′ S. lat., Patagonia extends southward to the Strait of Magalhaens, by which it is divided from the Antarctic Archipelago commonly called Tierra del Fuego. The most southern point of the South American continent and of Patagonia is Cape Froward, near 53° 55′ S. lat. and 71° 25′ W. long. On the east Patagonia is washed by the Atlantic, and on the west by the Pacific Ocean. The line which divides it from Chili is not quite determined, but it is supposed that it is formed by Reloncavi Sound and Reloncavi Inlet (between 41° [illegible] and 42′ S. lat.), which constitute the innermost recess of the Gulf of Ancud, which separates the island of Chiloe from the continent. Farther north the Andes constitute the boundary up to 40° S. lat. According to a rough estimate, the area of Patagonia exceeds 276,000 square miles, or is about 72,000 square miles more than that of France.

Patagonia comprehends two regions, which differ from one another in nearly every respect—the mountain-region and the plains. The mountain-region occupies the countries extending along the shores of the Pacific and the western portion of the Strait of Magalhaens. The plains occupy the eastern part of the country, stretching out along the Atlantic and the eastern part of the Strait of Magalhaens.

The mountain-region comprehends the southern portion of the Andes. This extensive mountain-chain begins near 52° 10′ S. lat., on the northern shores of the inlet called Ancon sin Salida, or Sound without Outlet. That portion of the mountain-region which is south of that inlet may be considered as an appurtenance of the chain, but not as constituting a portion of it, for it is divided from it by a deep arm of the sea, and also intersected by another channel. It is a remarkable and characteristic feature of the southern part of the mountain-region of Patagonia that it is cut through by two long but comparatively narrow inlets, which extend to the plains east of the mountains, and there expand into large salt-water lakes. The southern of these lakes or inland seas may be compared to the Mediterranean, as it consists of two basins united by a narrow channel of moderate extent, and connected with the Strait of Magalhaens by a strait of larger dimensions. The last-mentioned strait, called Jerome Channel, branches off from the Strait of Magalhaens near 53° 35′ S. lat. and 72° 30′ W. long., and extends northward with a slight bend to the west to 53° [illegible], where it turns north-east, and gradually widens into Otway Water. It is upwards of 30 miles long, and generally [illegible] miles wide. Otway Water, the southern of these inland sea-basins, extends towards east-north-east, and increases in width as it proceeds eastward. Near Jerome Channel it is hardly six miles wide, but towards its eastern extremity above twenty. Its length is probably 50 miles; the eastern extremity however has not been explored. The navigation of this inland sea is dangerous, even for large boats, on account of the strong tide-currents and gales. Not far from the north-eastern extremity of Otway Water, a narrow winding channel runs north by west to another inland sea-basin. This channel is called Fitzroy Passage, and the basin Skyring Water. Fitzroy Passage is about eight miles long, and [illegible] anywhere above half a mile wide, but it has depth enough for the largest vessels. It enters Skyring Water at its [illegible] eastern extremity. The last-mentioned inland sea basin extends from the northern entrance of Fitzroy Passage [illegible]ward about 50 miles in length, varying in width between

8 and 12 miles. It contains a number of rocky islands, among which that called Dynevor Castle rises to a considerable elevation.

The southern inland sea in form bears some resemblance to the Baltic. The main body is of comparatively small extent, but it sends out several branches, which advance to a considerable distance inland. This sea has not yet received a general denomination, and we shall name it Kirke Water, to commemorate the exertions of a seaman in the exploration of this basin. From Smyth Channel, which divides Queen Adelaide's Archipelago from the continent of South America, near 52° 10′ S. lat., a long and crooked strait branches off to the east, which is called Ancon sin Salida, and extends between high mountains about 30 miles from the shore in a straight line, when it opens into Kirke Water, a basin about 30 miles long, and on an average eight wide. This basin extends first north-north-east, but afterwards it turns to the east. From this main body of the basin two deep inlets branch off, one towards the north and the other southward. Each of them is above 20 miles long, and they vary from one to three miles in width. The northern, called Last Hope Inlet, turns to the west-north-west, and terminates about six miles from the shores of the Pacific; the southern, called Obstruction Sound, which at its extremity bends to the south-west, is there only about six miles distant from Skyring Water, but separated from it by high ranges of hills. A deep and narrow inlet runs northward from the strait which unites this basin to the ocean, intersecting the country between the ocean and Last Hope Inlet for nearly 30 miles from the Ancon sin Salida. It is called the Canal of the Mountains.

These three inland seas, Otway Water, Skyring Water, and Kirke Water, lie properly within the mountain-region of Patagonia, but their eastern extremities border on the eastern plains, being bounded only by ranges of flat low hills. Thus the southern portion of the mountain-region consists of two isolated districts. The more southern of these districts, which is enclosed on three sides by the Strait of Magalhaens, and on the north by Otway Water, is called Brunswick Peninsula, and is connected with the main body of Patagonia only by the isthmus which extends from the eastern shores of Otway Water to the Strait of Magalhaens, opposite Elizabeth Island. This isthmus is from seven to ten miles wide, and, as far as our knowledge goes, low, and partly occupied by lakes. The shores of Brunswick Peninsula have been examined with unusual care along the three sides where it is washed by the Strait of Magalhaens, and laid down with great accuracy. Still it does not appear that a stream above the size of a mountain-torrent finds its way to the strait itself. This seems rather strange, when we consider that the area of the peninsula probably exceeds 1000 square miles. The whole drainage therefore must run off northward to Otway Water, which is owing to the singular disposition of the highest ground of this tract. South of the isthmus which divides Otway Water from the Strait of Magalhaens, a range of hills, called Brecknock Hills, rises to from 1000 to 1200 feet, and is only a few miles from the strait, and parallel to it. In proceeding southward in that direction it rises into mountains, covered with snow, and consequently more than 3000 feet above the sea-level. Where the mountains approach Cape Froward they sink under the line of perpetual congelation, but Mount Tarn is 2600 feet high, and the mountains at the back of the Cape are estimated at 2500 feet. It appears that the mountains continue close to the shore of the strait farther west-north-west to the entrance of Jerome Channel, and then north-north-west and northward along the last-mentioned channel to the place where Otway Water opens to view. This latter range seems less elevated, as the highest summit, Mont Cont, near Port Gallant, is only 2000 feet high. What is the character of the country enclosed by this nearly semicircular range, we do not yet know. It does not appear to contain high mountains, for if such existed, they would have been seen when Captain Fitzroy took a view of the country from some hills near Fitzroy Passage. There are reasons for supposing that this country may turn out to be fit for cultivation. Captain King observes that the southern shores of this peninsula, though extremely rocky, are distinguished by luxuriant vegetation, and that the trees attain there a full growth, while farther west they are stunted. The climate, though colder than in Europe at an equal distance from the pole, is not subject to extreme cold. The greatest disadvantage is the moisture of the atmosphere and the frequent rain, which is owing to the peninsula being open to the winds from three quarters of the compass. But as the interior of the peninsula is sheltered from these winds by the surrounding mountains, it probably partakes much less of this continual moisture than the shores of the strait.

The tract of country, or rather peninsula, which is enclosed by Otway Water, Fitzroy Passage, Skyring Water, and the western portion of the Strait of Magalhaens, is called Ponsonby Land. The eastern part of it contains low wooded tracts of considerable extent along the shores of both waters, but the interior is occupied by hills, rising to about 1500 feet, with the exception of one summit, Mount Misery, which is near 72° W. long., and attains an elevation of about 2000 feet. It rises above the line of trees, but does not attain the snow-line. The western portion of Ponsonby Land is covered with rocky mountains. On Croker Peninsula and the adjacent district they do not appear to attain a great elevation. But on the shores of Skyring Water, west of 72° 30′, several of them rise above the snow-line and send down extensive glaciers on their slopes towards the sea. These high snow-capped mountains continue across the narrow isthmus which divides Skyring Water from Beaufort Bay, and attain their greatest elevation in Mount Burney, which is situated not far from the southern shores of the Ancon sin Salida, and is 5800 feet high. Thus we find that between 52° and 53° 30′ S. lat. the highest part of the mountain-region is nowhere more than ten miles from the shores of the Pacific, and frequently much nearer. Farther eastward the mountains decline in height, and are intersected by level tracts of some extent, until they disappear in the plains of eastern Patagonia, about 40 or 50 miles from the Pacific. This is especially observable on Kirke Water, the eastern shores of which, as well as those of Obstruction Sound and Last Hope Inlet, are low, and at some distance only exhibit some broad-backed hills of moderate elevation and extent. A tract of similar character was observed along the eastern part of the northern shores of Skyring Water.

The Andes, that elevated chain which traverses South America in its whole length, begin on the south, on the very shores of the Ancon sin Salida (52° 10′ S. lat.). The narrow inlet called the Canal of the Mountains, which runs nearly 30 miles, is enclosed on both sides by a range of steep mountains, broken here and there by deep ravines filled with frozen snow, and surmounted by extensive glaciers, from which huge avalanches frequently descend. These two ridges unite on the isthmus between the Pacific and the north-western extremity of Last Hope Inlet, and at this point the mountain-mass of the Andes does not appear to be more than ten miles wide. As the summits are always covered with snow, they probably exceed 4000 feet in elevation. The mountains continue northward close to the shores of the sea, so as to leave no level ground along the beach. It seems that the higher part of this range is always covered with snow, at least the inlets of St. Andrew's Sound (50° 30′ S. lat.) are closed at their extremity by immense glaciers. In this part the range seems to be about 40 miles wide, and on its eastern edge is situated Mount Stokes, 6400 feet above the sea-level. North of 50° S. lat. the mountain range seems to preserve a general width of forty miles, and the whole of this space seems to be occupied by mountains rising above the snow-line, or approaching it. They terminate on Messier Channel, which separates Wellington Island from the continent, in very high and precipitous rocks, which extend as far as 48° 30′ S. lat., and are frequently dotted with glaciers at the extremities of the inlets which penetrate the rocky masses. Between 48° 30′ and 47° S. lat. no snow-capped mountains are discovered near the coast, and it is not known, though it is probable, that they occur farther inland. The coast is hilly, but neither precipitous nor very high, and in many places there is much low and thickly wooded land. North of 47° S. lat. opposite the peninsula of Tres Montes some snow-covered mountains and glaciers again approach the sea. The peninsula itself consists of high rocky masses, connected by other rocks, which constitute the isthmus of Ofqui, with the snow-capped mountains lying farther east. Between 47° and 46° S. lat. is the volcano of S. Clemente, the most southern of the volcanoes of the Andes. North of the peninsula of Tres Montes, the highest portion of the Andes again comes close to the shores of the Pacific, and the most elevated summits are covered with perpetual snow, which in this latitude in summer seems to descend to 5000 feet above the sea-level. Mount Meli-moya, near 44° is about 8000 feet high. Three volcanoes in this range are visible from the island of Chiloe, the Yntales, 6725 feet high, the Corcovado (hump-backed) 7510, and the Minchinmadiva, 7046 feet. All these high summits are situated in the range which rises close to the shores of the Gulf of Ancud. We are not acquainted with the width of the Andes in this part. From the Strait of Magalhaens to 41° 48′ S. lat. the Andes constitute the very shores of the Pacific, and the watershed between the two oceans is so near the western coast, that the largest river which flows into the Pacific has its origin only 13 miles from the beach. This is the Rio S. Tadeo, the mouth of which is a little south of the peninsula of Tres Montes. The shores along this extensive coast-line are rocky and high, with the exception of a few places of very moderate extent. But there is a difference between those which are north of the peninsula of Tres Montes and those which are south of it. The former run nearly in a straight line, both the projecting rocks and the recesses between them hardly anywhere exceeding one mile in extent. But south of the peninsula the inlets penetrate many miles into the mountain-masses, and thus form huge promontories. The farther we advance to the south, the more the inlets increase in depth, until we reach the Ancon sin Salida and the Jerome Channel, which extend across the whole mountain-region.

But the open sea of the Pacific does not wash this rocky coast. A series of high and rocky islands lie like a barrier in front of it, so that no part of the continent, except the peninsula of Tres Montes, is exposed to the ocean's swell. Some of these islands are of great extent; others are only separated from one another by narrow straits, which are not visible at some distance from the open ocean, and the islands accordingly appear to be a continuous high rocky shore. The most northern is the island of Chiloe [CHILOE], between which and the continent is the Gulf of Ancud. This island is separated from the Chonos Archipelago, which lies farther south, by a channel nearly 20 miles wide. The Chonos Archipelago occupies the space between 44° and 46° S. lat., and consists of numerous islands, some of which are of considerable extent: they are divided from one another by narrow straits, and the sea between them and the continent is full of cliffs and rocks. Then follows the peninsula of Tres Montes, which is nearly isolated by a deep bay that enters the continent from the north, and extends about 30 miles southward. South of the peninsula is the Gulf of Peñas, which contains only scattered islands; but near 47° 30′ S. lat. is the small group of the Guaianeco Islands, followed by Wellington Island, which extends from 47° 50′ to 50° S. lat., and in some parts is 60 or 70 miles wide. It is however conjectured that the northern and western parts of this extensive island are divided into several smaller islands by narrow channels. The long strait which separates Wellington Island from the continent, and is called Mesier Channel, is on an average two miles wide towards each extremity; but in the middle, and for a length of about 40 miles, it is hardly a mile wide, and in three particular places not more than 400 yards wide. A broad channel, called the Gulf of Trinidad, separates Wellington Island from the Archipelago of Madre de Dios. This archipelago, which is little known, is separated from the continent and Hanover Island by Concepcion Strait. Hanover Island extends nearly a degree north and south, but it is not ascertained whether or not it consists of several islands. The strait south of this island, called Lord Nelson's Strait, separates it from the archipelago of Queen Adelaide, an assemblage of islands which run more than 80 miles north-west and south-east: only a small number of them have been surveyed, namely, those which lie contiguous to Smyth Channel, which separates the archipelago from the continent, and those which constitute the northern shores of the Strait of Magalhaens, which strait lies between them and South Desolation Island. [MAGALHAENS, STRAIT OF.] These islands are, without exception, high and rugged, and have a rocky shore; but the mountains in none of them rise to the snow-line, except on South Desolation.

The interior of this region is almost entirely unknown, but we have some information respecting the climate of the coast and the islands. The difference of geographical position between the two extremes being fourteen degrees, one would expect to find a greater difference in the tempe'ure than really exists. On the island of Chiloe the m temperature of the winter seems to be 45°, and that of the spring 50°, or somewhat more. It is probable that the mean annual temperature is as high as that of London, for though the summer-heat is less, the cold is not so great in winter, and ice is never formed in the low country. Mr. Darwin has compared the temperature of Port Famine, on the Strait of Magalhaens, at the other extremity of the mountain-region of Patagonia, with that of Dublin, in the following table:—

	Lat.	Summer temper.	Winter temper.	Difference.	Mea
Dublin . .	53° 21′ N.	59°.54	39°.2	20°.34	49°.
Port Famine .	53 38 S.	50	33°.08	16°.92	41°
Diff.	0 17	9°.54	6°.12	3°.42	7°

It would therefore appear that the difference in the mean annual temperature between S. Carlos in Chiloe and Port Famine does not exceed ten degrees of Fahrenheit, and we do not think that a country of similar extent can be pointed out on the surface of the globe where such a small difference in temperature occurs. This phenomenon is due to the great dampness of the atmosphere. As the prevailing winds blow from the west, they bring to the land the moisture which they collect in passing over the wide expanse of the Pacific; and this moisture being suddenly condensed when it comes in contact with the high mountains along the shores, descends in abundant and nearly continual rain. In Chiloe fine weather alternates with heavy rain from September to March; but in the other six months a day seldom passes without abundant rain. On the peninsula of Tres Montes only two or three weeks in November are without rain, and farther south there is hardly a day without either rain or snow and sleet, according to the seasons. North-west winds prevail, and bring clouds and rain in abundance: strong south-westers succeed them, and partially clear the sky: the wind then moderates, and hauls into the south-east quarter, where, after a short interval of fine weather, it dies away. Light breezes spring up from the north-east, freshening as they wear round to north, and augment the store of moisture which they always bring. From the north they soon shift to the usual quarter, north-west, and between that point and south-west they shift and back sometimes for weeks before they take another turn round. It never blows hard from the east, rarely with any strength from north-east, but sometimes from south-east, especially about the middle of winter (from June to August). The north-western gales are sometimes so furious that the houses are not secure, and the largest trees are torn up by the roots. In summer southerly winds last longer and blow more frequently than in winter.

The constant dampness of the air, though not favourable to many European plants, especially to fruit-trees, maintains a vigorous vegetation. The forests, which cover the sides of the mountains for two-thirds of their height north of 45° S. lat., rival in luxuriance those of the tropical regions. Stately trees, with smooth and highly coloured barks, are covered with parasitical plants; large and elegant ferns are numerous, and arborescent grasses twine round the trees to the height of 30 or 40 feet. South of 45° S. lat. vegetation is less vigorous; but even at the most southern extremity, on the Strait of Magalhaens, the country and hills, from the height of 2000 feet above the sea to the very verge of high-water-mark, are covered with trees, mostly evergreens, and some large enough to be used as timber, as the evergreen beech (Fagus betuloides), and two other species of beech. Capt. King saw large and woody-stemmed trees of Fuchsia and Veronica, in England considered as tender plants, in full flower within a very short distance of the base of a mountain covered two-thirds down with snow, and this with a temperature of 36°.

Where the mountains border on the eastern plains, a kind of deer, with short straight horns, is abundant. There are also pumas as far south as 53° S. lat., cavias, and nutrias; seals, otters, fur-seals, and sea-elephants. Fish is very plentiful, especially several smaller kinds, which live in the subaquatic forests formed by the gigantic sea-weed (Fucus giganteus of Solander), which covers all the rocks near the open coast and in the numerous straits. Land-birds are not numerous, but water-fowl abound, among which there is the black-necked swan (Anser nigric… and several kinds of geese and ducks. Shell-fish of several kinds occur in the recesses of the inlets, and they constitute the principal food of the inhabitants during a part of the year. On the Guaianeco Islands and the Chonos Archipelago the potato grows wild. The largest dug up on an island of the last-mentioned archipelago measured two inches in length and an inch in thickness: they were quite tasteless.

The plains of Patagonia, which occupy the greater portion of the country, extend along the Atlantic Ocean. The line which separates them from the mountain-region is only known south of 49° S. lat.: it begins on the shores of the Strait of Magalhaens at Cape Negro (53° S. lat. and 70° 50′ W. long.), and thence runs west-north-west to the north-eastern extremity of Otway Water, follows the channels of Fitzroy Passage and the northern shores of Skyring Water to 72° W. long., and then extends along the eastern shores of Obstruction Sound, Kirke Water, and Last Hope Inlet. It leaves the last-mentioned inlet near 71° W. long., and runs due northward to Mount Stokes and Lake Viedma (49° S. lat.). Farther north the boundary-line is not yet known.

These plains, though similar in aspect, seem nevertheless to differ in their natural capacities. Between 47° and 48° S. lat. the coast forms a wide promontory, projecting near 100 miles from the body of the mainland. On this promontory, or, to speak more precisely, at the back of Cape Blanco, are the high lands of Espinosa, which are visible from the sea. They rise at least 4000 feet above the sea, and form a range of an irregular form with several peaked summits. It is not improbable that this range extends westward until it joins the Andes. On this promontory and the contiguous coast, as far north as 45° S. lat. and southward to 49° S. lat., the rocks are porphyritic, but they seldom rise more than 300 or 400 feet above the sea-level, when they stretch westward in an undulating plain, which is covered with a light sandy soil, through which the rock protrudes in many places. This tract is dry and parched, and has no vegetation except a few tufts of grass and here and there a straggling bush of barberry or of a dwarf woody shrub which supplies good fire-wood. There is no water. This tract is frequently traversed by the native tribes, but they never seem to stay there for any length of time.

South of 49° S. lat. to the northern shores of the Strait of Magalhaens, the coast presents an aspect similar to that of the county of Kent in England, but instead of chalk, the cliffs are composed of soft marly clay, without any gravel or impression of organic remains. Between the high and low tide mark, there is a smooth beach of green clay hardened by the action of the surf to the consistence of stone, which extends about a hundred yards into the sea, and is succeeded by a soft green mud, over which the water gradually deepens. The outer edge of the clay forms a ledge parallel to the coast, upon the whole length of which the sea breaks with violence. The sea-beach between the high-water mark and the cliffs is narrow, and consists of shingle with scattered masses of green indurated clay. The cliffs themselves rise rather abruptly to the height of 200 or 300 feet. They form the descent of an elevated plain, which extends several miles westward, and is then followed by an escarpment of from 100 to 150 feet elevation, which constitutes the slope of another and more elevated plain. Thus the country extends from east to west in wide plains, which rise one above the other like terraces. About 100 miles from the shores, the plains seem to attain an elevation of near 1000 feet. Their surface is not quite level, but rises a little between the edge of any line of cliffs and the base of the next above it. The plains are traversed by some broad and flat-bottomed depressions. The soil consists of well-rounded shingle mixed with a whitish earth. It is in most places without vegetation. Here and there are scattered tufts of brown wiry grass, and still more rarely some low thorny bushes. In the depressions the bushes are more abundant, and in some places they grow up to stunted trees. Fresh water is seldom found, but salinas, or salt-pools, are numerous. Marine shells are frequently scattered over the plains, but they abound most on the plains nearest to the sea.

The plains are traversed from west to east by the Santa Cruz river, whose mouth is near 50° S. lat. It was ascended by Captain Fitzroy to a distance of 140 miles from the sea in a straight line, and 245 miles by the course of the river. The river runs in a vast excavation below the level of the neighbouring plains. East of 70° W. long., this valley varies between one and five miles in width, and is bounded on both sides by step-like terraces, which near the sea attain an elevation of only 200 feet, but gradually rise higher: west of 70° W. long., they are about 1000 feet above the valley. The valley is hardly more fertile than the plains which surround it, and no bushes grow in the upper part; even the wiry half-withered grass is scanty. West of 70°, the valley contracts in some parts to one mile in width, and here the upper part of the adjacent plains is capped with a layer of lava, which, where it begins, is only 120 feet thick, but farther west increases, so that at a distance of about 40 miles it is 320 feet thick. This part of the plain is 1400 feet above the valley, which is 400 feet above the sea. The lava seems to extend to the foot of the Andes, where the platform of the plains probably attains an elevation of 2000 or 3000 feet. The width of the lava seems to be about 100 miles. The layer of earth on which it rests does not differ from the materials of which the plains near the Atlantic are composed. Within the lava district, between 71° and 72° W. long., the valley is from 5 to 15 miles wide, and there is here a flat tract of apparently good land, exhibiting many swampy places covered with rich herbage; and higher up there is a large plain, on which shrubs, small trees, and bushes are sparingly scattered; yet parts of this plain may be called fertile and woody by comparison with the tracts farther east.

Though Captain Fitzroy ascended the Santa Cruz river within 30 miles from the Andes, and about 60 miles from the Pacific, he found that the volume of water did not diminish, whence he infers that its upper course must be along the base of the Andes from north to south, and that it rises not far from the sources of the southern branch of the Rio Negro, near 45° S. lat. It is supposed to traverse, in this upper course, several lakes, among which is Viedma or Capar Lake, which lies between 48° and 49° S. lat., and is about 30 miles long, and from 10 to 12 wide. On its western side the Andes rise above the snow-line. The Santa Cruz river runs on an average from 6 to 7 knots an hour, and in the course of 200 miles falls 400 feet. At its mouth it forms an estuary, in which the neap-tides rise 18 feet, and the spring-tides from 38 to 42. The extensive shoals which lie near the mouth of this river are ascribed to the meeting of the rapid stream with an extraordinary tide.

The country north of 45° S. lat. differs from the southern plains. The shores are fronted by rocky reefs extending from 2 to 3 miles from high-water mark, which are dry at low tides, and in many places covered with seals. The beach is rather steep, and consists of shingle. Above it extends an undulating country, which at some distance rises into hills. The summits of the hills nearest to the coast are generally of a rounded form, and as it were paved with rounded silicious pebbles, imbedded in the soil, and in no instance lying loose or in heaps. But the hills of the interior are flat-topped and uniform in height for many miles inland. Though the soil here also is gravelly and parched, and in most places exhibits a very scanty vegetation, the valleys and lower elevations are mostly covered with grass and shrubby plants. In several places there are tracts covered with good grass and stunted trees, especially at Camarones Bay and north of it. On the banks of the Chupat river and the western shores of New Bay (Bahia Nueva), there are extensive tracts covered with a fine dark soil, and producing abundance of fire-wood and excellent pasturage. Wild cattle abound, and are very numerous on the natural meadows which extend far inland on both sides of the Chupat river. The river Chupat, at the distance of 20 miles from its mouth, is only 100 yards wide, and six feet deep at low-water, so that only vessels drawing 7 feet water can enter its mouth at high-water. This river runs with a winding course through a wide and fertile valley, over which an immense quantity of drift timber is scattered, and large trees are found several hundred yards from its banks. This circumstance, and the volcanic scoria found on its banks, support the hypothesis that the river rises in the Andes, and inundates its valley to a great extent when the mountain snow is dissolved by the summer heat.

The climate of the plains differs greatly from that of the mountain-region. Their sterility is partly to be ascribed to the nature of the soil, and partly to the want of rain. Westerly winds are prevalent during nine months of the year, and though they drench the western declivity of the Andes with rain, not a drop falls on the plains while they blow. Even during the three winter months (from June to August) little rain falls except on rare occasions, when it comes down heavily for three or four days in succession. Sea-winds sometimes bring small fine rain for a few hours, all through the year, but not enough for the support of vegetable productions. But it appears that rain is more abundant in the interior of the plains north of 45° S. lat. The Rio Negro covers the adjacent country with water to a great extent in autumn (May and June), when no snow on the Andes is dissolved. These inundations are produced by the heavy rains which fall in the interior of the country. Otherwise the climate is healthy and pleasant. Generally a bright sunny day is succeeded by a cloudless and extremely clear night. In summer the heat is scorching, but not sultry; and in winter, though the weather is sometimes very cold, especially during southerly winds, the air is always elastic and wholesome. Changes of wind are sudden, and cause rapid though not very great variations of temperature. Sometimes the sky is slightly or partially overcast, and occasionally clouded heavily, but on most days there is a bright sunshine and a fresh or strong westerly wind.

The plains differ from the mountain-region both in vegetation and in animals. The natives have dogs and herds of horses, and there are wild cattle, as already mentioned, on the banks of the river Chupat. Guanacoes are very numerous, but more so in the southern than in the northern plains. Pumas are found everywhere, and wolves on the northern plains. There are several species of foxes, as well as cavias, armadillos, and tucu-tucu, a little animal like a rabbit. On the coast there are common seals, fur-seals, and sea-lions. Land-birds are not numerous, except emus, condors, and carrion-hawks. Teals, partridges, doves, snipes, and rails however are frequently met with, which pass southward or northward according to the season. The sea-birds consist of gulls, grebes, and penguins. There is no fish in the Santa Cruz river owing to its great rapidity, but on the coast they are rather plentiful, the larger species resembling cod, ling, and salmon. Insects are rare, except scorpions. Between Cape Blanco and Port Desire there are numerous *salinas*, or extensive hollows filled with salt, in which the solid mass is several feet thick, and consists of very white and good salt. Near Port S. Julian there are salt lakes, in which the salt crystallizes in great cubes.

Inhabitants.—The inhabitants of the mountain-region are different from those of the plains. The natives of the plains are called Patagonians, or Horse-Indians, as they wander about in the interior on horseback, and do not live on the shores. The natives of the mountain-region are called Canoe-Indians, because they live only on the sea-coast, and frequently remove from one inlet to another in canoes. The latter are at present comprehended under the name of Fuegians, it being certain that they belong to the same race with the inhabitants of the western part of Tierra del Fuego.

The Patagonians were so called by Magalhaens when he saw them at Port S. Julian in 1520. He found them to be of a gigantic stature, seven French feet in height, and their feet being wrapped up in rough guanaco skins particularly attracted the attention of the Spaniards. Probably their footsteps in the sand were noticed, and excited some such exclamations as 'que patagones!' (what large feet!). His account of the gigantic stature of these people was partly confirmed and partly contradicted by later navigators. About the middle of the last century Captain Byron met with a number of Patagonians, of whom the men were not less than eight feet, and some even exceeded nine in height; the women were from seven feet and a half to eight feet. This account was contradicted by Wallis and Bougainville. It seems that there has been some exaggeration in the accounts of the great stature of the Patagonians; but even the skilful officers who conducted the last survey of these coasts admit that the Patagonians are distinguished by their size. Captain Fitzroy observes that among two or three hundred of these people scarcely half a dozen men are seen whose height is under five feet nine or ten inches, though none have recently been measured who exceeded six feet and some inches. Their head, according to Captain Fitzroy, is rather broad, but not high, and except in a few instances, the forehead is small and low. Their hair, which hangs loosely, is black, coarse, and very dirty. Their brow is prominent, and the eyes rather small, black, and ever restless. Deficiency of eyebrow heightens the peculiar expression of the eyes, and imparts to their physiognomy a mixture of simplicity and shrewdness, daring and timidity, together with that singular wild look which is never seen in civilised man. Their faces are roundish, and the projection of the cheek bones makes them look unusually wide. The nose is a little depressed, narrow between the eyes, but broad and fleshy between the nostrils, which are rather large. The mouth is large and coarsely formed, with thick lips. Their teeth are often very good, though rather large. The chin is usually broad and prominent. All the features are large except the eyes. They have little hair either on the face or the body, and they attempt to eradicate it. Their hands and feet are comparatively small. Their limbs are not so muscular as their height and apparent bulk would induce one to suppose; they are also rounder and smoother than those of white men. Their colour is a rich reddish brown, between that of rusty iron and clean copper, rather darker than copper, yet not so dark as good old mahogany. A large mantle made of skins sewed together, loosely gathered about their bodies and hanging from the shoulders to the ankles, adds so much to their apparent magnitude, that one can hardly be persuaded that they are only a few inches above six feet, till they are actually measured. The Patagonians wander about in the extensive plains south of the Rio Negro, and traverse that immense distance (800 miles) in a comparatively short time. The same individual was seen at Gregory Bay in the Strait of Magalhaens, in November, 1831; at the Rio Negro, in September, 1832; and again at Gregory Bay, in March, 1833. Their principal subsistence is the flesh of mares, emus, cavias, and guanacoes. They broil their meat and eat it with a lump of fat and salt. There are two wild roots which they eat, one called *tus*, and the other *chālās*. The *tus* is a bulbous root, which, when cleaned and baked, becomes nearly like a yam. The *chālās* is a long white root about the size of a goose-quill, and is eaten roasted or put in broth which they make for women and sick people. Dogs are not eaten, nor are horses, unless disabled by accident. Their huts are in shape not unlike gipsy-tents. They consist of poles stuck in the ground, to which others are fastened; the whole is covered with skins sewn together, except towards the east, where they are open.

That tribe of Patagonians which principally visit the southern plains is called Te-huel-het, or Southern People. In the stony district between 49° and 45° none of the tribes seem to make a long stay. North of 45° there are said to be three other tribes: the Pe-huel-che, or Eastern People, who move about in the country along the coast; the Chilian Indians, who ramble over the districts adjacent to the Andes south of 42°; and the Molu-che, or Warrior Indians, who occupy the interior of the country south of the Rio Negro to about 42° S. lat.

The mountain-region is inhabited by two tribes of the Fuegians. Near Otway and Skyring Waters is a tribe which Captain Fitzroy calls Huemul, because they have many skins of a kind of roebuck, which is called by Molina, in his 'History of Chili,' huemul. Another tribe, which inhabits the western coast of Patagonia, between the Strait of Magalhaens and the promontory of Tres Montes, he calls Chonos, founding the name on the supposition that this tribe once advanced as far north as Chiloe, and spread over the Chonos Archipelago, which at present is quite uninhabited. The Fuegians are rather short, varying in height from 4 feet 10 inches to 5 feet 6 inches, yet their bodies are as bulky as those of a man of six feet. Their limbs and joints are short in proportion to the trunk, which gives them a clumsy appearance. Passing so much time in their huts (wigwams), or cramped in small canoes, the shape and size of their legs are injured, and they move about in a stooping posture, with the knees much bent. Their colour is that of old mahogany, or rather between dark copper and bronze. The average height of the women is four feet and some inches. The most remarkable traits in their countenance are, an extremely small low forehead, a prominent brow, small eyes, wide cheek-bones, wide and open nostrils, a large mouth, and thick lips. Their eyes are black, sunken, and as restless as those of savages in general. The nose is always narrow between the eyes, and almost flat. The hair is black, coarse, and lank. Their shoulders are square but high, and the chest and body very large. The arms and legs are rounder and less muscular than those of Europeans. The muscles of the thighs are large, but those of the legs small. It is remarkable that, though living in a very cold climate, they have seldom any covering, for a scrap of hide, which is tied to the side or back of the body by a string round the waist, serves only as a pocket. The women have generally a seal skin wrapped about them and a diminutive apron. Their canoes are made of sevepieces of bark sewed together, from 12 to 20 feet long, and from 1 to 2 feet wide in the middle, the extremities being drawn together. Their wigwams or huts are shaped like bee-hives, about 6 feet high and from 4 to 8 yards in diameter. They are made of branches of trees, stuck into the ground and bent together towards the top, on the outside of which skins, pieces of bark, and bunches of coarse grass are roughly fastened. The Chonos Indians have canoes, or rather boats, made of planks sewn together with strips of twisted bark and caulked. These boats are nearly 30 feet long and 7 feet broad, and are pulled with oars. The tribes are dispersed among the islands in small families, on account of the scarcity of food. They live only on seals, birds, fish, and particularly shell-fish, and they are consequently always moving from one place to another. During the summer they prefer the coast, where they obtain a great quantity of eggs and young birds, besides seals, which come to shore to breed at that season. In winter they retire more to the interior parts in search of shell-fish, and the small but numerous and excellent fish which they catch among the sea-weed (*Fucus giganteus*). The Fuegians, like all savages living on the produce of fishing, seem much more inclined to improve their condition by adopting the habits of foreigners than the Patagonians or other American tribes who subsist by the chase.

(*Surveying Voyages of the Adventure and Beagle*; Parish's *Buenos Ayres and the Provinces of La Plata.*)

PATAN. [Hindustan, vol. xii., p. 225.]

PATAPSCO. [Maryland.]

PATIAN. [Sulo-Archipelago.]

PATEL. This painter was a native of France, but neither his age nor the master under whom he studied is known, which is not a little surprising, considering the high and deserved admiration in which his works are held. He appears to have taken Claude Lorraine for his model, and in his own country he is called the French Claude. It cannot indeed be said that he equalled that great artist, yet it is no mean honour to have imitated him successfully. His works show that he diligently studied nature. His subjects were always well chosen; his foregrounds are judiciously broken, his distances admirable; the scenery, rocks, and the forms of his trees remarkably elegant and airy. The antique buildings, ruins of aqueducts, vases, and other ornaments give great variety and richness to his pictures. His touch is light and firm, and his colouring clear and natural. His figures are superior to those of Claude, being generally elegant and correctly drawn.

PATELLA. [Skeleton.]

PATELLA. [Cervicobranchiata.]

PATENT. Before applying for a patent for an invention, two considerations are necessary: first, what is entitled to a patent; and next, whether the invention has the requisite conditions.

In the first place, the machine, operation, or substance produced, for which a patent is solicited, must be new in public use, either the original invention of the patentee, or imported by him and first made public here. A patent may be obtained for England, Ireland, or Scotland, although the subject of it may have been publicly known and in use in either or in both of the other two countries.

In the second place, the subject of the invention must be useful to the public, something applicable to the production of a vendible article, this being the construction put upon the words 'new manufacture' in the statute of James I. The discovery of a philosophical principle is not considered entitled to such protection; such principle must be applied, and the manner of such application is a fit subject for a patent.

Inventions entitled to patent may be briefly enumerated as follows:—

1. 'A new combination of mechanical parts, whereby a new machine is produced, although each of the parts separately be old and well known.

2. 'An improvement on any machine whereby such machine is rendered capable of performing better or more beneficially.

3. 'When the vendible substance is the thing produced, either by chemical or other processes, such as medicines or colours.

4. 'Where an old substance is improved by some new method, the means of producing the improvement is to be considered a new principle.'

If the inventor finds that the machine, operation, or substance produced comes under any of these enumerations, and that it is new, and likely to be useful to the public, he may enter a caveat at the Patent Office, and at the offices of the attorney-general and the solicitor-general, in the following form:—

'*Caveat* against granting letters-patent to any person or persons for (here describe the invention in the most general terms), without giving notice to A. B., of , in the county of .'

(Date.)

These caveats stand good for twelve months, and may be renewed from year to year: the fee for entering such caveat is 5*s.* at each office.

As soon as the caveat is entered, the inventor may find it necessary to obtain the assistance of workmen or others, in order to carry his invention into effect; and if in doing this he should make known to them his invention, he will not thereby lose his right to a patent. Any communication which is necessary for carrying his ideas into effect is not considered as a legal publication, which would of course vitiate his right, as the invention could no longer be called new. But though the inventor is thus protected in his experiments, and is safe while dealing with honest people, he is not protected against fraud. If a person in the secret should make such invention public, or cause it to be used by several persons between the time of entering the caveat and the next stage of proceeding, that of sending in the petition, no patent could be obtained, as the declaration that accompanies the petition could not be made, or, if made, would be untrue. Again, if such workman, instead of making it public, were to give to some other person the necessary information, the latter might apply for a patent for such invention as his own; and if he could succeed in concealing the source of his information by a false declaration, he might force the real inventor to allow him to participate in such patent, or to forego it altogether. The caveat can do no more than prevent any one stealing the ideas of an inventor and appropriating them to his own use, to the exclusion of the inventor; and it will also ensure notice of any application for a patent for a similar invention, and, in some cases, prevent the expenditure of time and money upon a subject for which no patent could be obtained. This is all that a caveat can do: its effect is frequently much overrated. If any one apply for a patent, the title of which is similar to that contained in the caveat, the attorney or solicitor general will send a notice of such application to the enterer of the caveat, who, if he should think such application likely to interfere with his invention, must, within seven days from the receipt of the notice, state in answer his intention of opposing such patent.

The attorney or solicitor general then summons the applicants to appear separately before him; and if he should be of opinion that the two patents will interfere with each other, or are virtually the same, the usual course is not to grant any patent except to the two claimants conjointly, though if priority of invention can be proved by either, he has undoubtedly the right to the protection of the statute.

If the invention is of such a nature that it can at once be perfected or put into operation, no caveat is needed; and indeed a caveat may be the means of exciting the very attention and opposition which it is intended to prevent. Where some experiments or operations which require assistance must be performed before a definite title can be given to the invention, as must be done in the declaration and petition, it is much better to avoid the caveat, and by getting the different parts of the machinery or operations performed by different persons, if possible, keep the invention a secret until the patent right be secured.

The next step is to draw up a petition to the crown, before doing which however the title of the patent must be settled. To those who have not considered the subject, this may not seem a very difficult matter, but in fact it requires the greatest care; for the least discrepancy between the title and the description contained in the specification will endanger the patent. (See the evidence of Mr. Farey and others before a Committee of the House of Commons upon this subject, 1829.)

The title should set forth the subject of the patent in such terms that any one may see if a patent has been taken out or applied for in the case of any similar invention.

The titles of patents collectively should form an index of the inventions thus protected. It is a common practice however to make the title as obscure as it can be made without endangering the patent, in order that the real object of it may be kept secret. But this is a matter of great difficulty, and has often justly vitiated a patent. The law requires all patented inventions to be open to public inspection, and the enterer of a caveat may be cheated by a title, for although the subjects may be the same, a title may express the invention so faintly, or indeed so falsely, that the similarity of two inventions may escape the notice of the attorney-general, and injustice may be done by granting a patent to one party while priority of invention belongs to another. By the 5 & 6 Will. IV., c. 83, a patentee is allowed to enter a disclaimer of any part of the title or specification with the consent of the attorney-general or solicitor-general, who may order such disclaimant to publish his disclaimer. This act supplies a remedy for unintentional errors, but is ineffectual where the title is purposely made obscure. Besides this, the disclaimer does not operate retrospectively, so that if an action be commenced before the entry of the disclaimer, the title and specification must be adduced on the trial as they originally stood. A caveat may be entered against the granting of such disclaimer.

The following are a few instances of patents being lost through defective titles:—

In the case of King *v.* Metcalfe (2 Starkie, N. P. C., 249), the subject of the patent was a hair-brush, in which the hairs were of unequal length: in the title it was described as a 'Tapering Brush,' which was considered as intended to mislead the public, as not being a description of the subject of the patent, and it was annulled accordingly. In Cochrane *v.* Smethurst (K. B., 1 Starkie, 205), the patent was for a certain lamp, but the title called it an 'Improved Method of lighting Cities, Towns, and Villages.' The patent in this case was held to be void, as the specification only described a new lamp, and not an 'improved method of lighting' at all; and it was also objected, that as it was equally applicable to lighthouses, harbours, shipping, &c., the title was otherwise imperfect. If the title had been for an 'Improved Lamp' or an 'Improvement on Lamps,' the patent would have been valid. In the case of King *v.* Wheeler, the patent set forth in its title a 'New and Improved Mode of Drying and Preparing Malt,' whereas the specification described a method of reburning malt which had already been made, so as to produce a colouring matter for beer and other liquors. Now it is evident that if any one had intended to take out a patent for producing colouring matter, he would never have collected from this title that the patent was likely to interfere with his invention. In the case of Bloxam *v.* Elsee (6 Barn. and Cress., 169 & 178), the title of a patent which came in question was 'A Machine for making Paper in Single Sheets, without Seam or Joining, from 1 to 12 feet and upwards in width, and from 1 to 45 feet and upwards in length.' The specification however described a machine only capable of producing paper of one width or to a certain width. Now if an inventor who thought of taking a patent for a machine to make paper of a greater width than 12 feet had looked at the title only of this patent, he would have supposed that such a patent already existed; but if he had inspected the specification, he would have found that it did not bear out the title, as the machine therein described was not capable of making paper of a width greater than 12 feet. The patent then was invalid, as the title comprised more than the specification. This is the most common error that patentees fall into. Jessop's case, cited during the trial of Boulton and Watt against Bull, in 1795, by Mr. Justice Buller, is another instance. A patent was taken out for a 'New Watch,' whereas the specification only described a particular movement in a watch, which was the real invention, and the patent was therefore void.

An honest and valid title may be stated, in a few words, to be, a description of the precise object of the invention in the most simple language.

The title being settled, the petition must be drawn in the following form:—

'The humble petition of A. B., of , in the county of .

'Showeth,

'That your petitioner hath invented (here insert the title which you intend the patent to bear), that he is the first and true inventor thereof, and that it has not been practised by any other person or persons whomsoever, to his knowledge and belief.

'Your petitioner therefore most humbly prays that your Majesty will be graciously pleased to grant unto him, his executors, administrators, and assigns, your royal letters-patent under the great seal of Great Britain for the sole use, benefit, and advantage of his said invention within England and Wales and the town of Berwick-upon-Tweed, *and also in all your Majesty's colonies and plantations abroad*, for the term of 14 years, pursuant to the statute in that case made and provided.'

The passage in Italics must be omitted if the inventor does not intend to obtain patent for the colonies. This petition, with a declaration annexed, must be left at the office of her Majesty's secretary of state for the home department. The declaration is in lieu of the affidavit which was required until the passing of the Act 5 & 6 Wm. IV., c. 62.

A few days after the delivery of the petition, the answer may be received; which contains a reference to the attorney or solicitor general to report if the invention is deserving of letters-patent. If such report be favourable, it must be taken and left at the Home-office for the queen's warrant, which is addressed to the attorney or solicitor-general, and directs the bill to be prepared. The bill is in effect the draft of the patent, and contains the grant with an allusion to the clauses and provisos in the letters-patent. It is signed by the secretary of state for the home department, and by the attorney or solicitor general. If at this stage of the proceeding any person should wish to oppose the patent, a caveat may be entered in the manner already described, but the enterer is required to deposit 30*l.* at the office of the attorney or solicitor general to cover the patentee's expenses if he should succeed in establishing his right to patent. The bill, when prepared, must be left at the office of the secretary of state for the home department for the queen's sign manual. It must then be passed at the signet-office, where letters of warrant to the lord-keeper of the privy seal will be made out by one of the clerks of the signet; and lastly, the clerk of the privy seal will make out other letters of warrant to the lord chancellor, in whose office the patent will be prepared, sealed with the great seal, and delivered to the patentee. Considering the number of offices through which a patent passes, it might be supposed that the inquiry into the validity of the claim is very rigid, and that, when once the patent is sealed, it is safe from opposition. But in reality the law officers through whose offices it is carried exercise no opinion upon the validity of the patentee's claim; the whole responsibility rests upon himself, as will be seen by perusing the following abstract of the form of letters-patent:—

The first part of the patent recites the petition and declaration, and sets forth the title which has been given to the invention by the inventor.

The 2nd relates to the granting the sole use of the invention to the inventor for the space of fourteen years, whereby all other persons are restrained from using the invention without a licence in writing first had and obtained from the patentee, and persons are restricted from counterfeiting or imitating the invention, or making any addition thereunto or subtraction therefrom, with intent to make themselves appear the inventors thereof. This clause also directs all justices of the peace and other officers not to interfere with the inventor in the performance of his invention.

The 3rd part declares that the patent shall be void, if contrary to law or prejudicial and inconvenient to the public in general, or not the invention of the patentee, or not first introduced by him into this country.

The 4th declares that letters-patent shall not give privilege to the patentee to use an invention for which patent has been obtained by another.

The 5th relates to the manner in which letters-patent become void, if divided into more than a certain number of shares. The number of such shares used to be five, but all patents sealed since May, 1832, allow the interest to be divided between twelve persons or their representatives. This part also relates to the granting of licences.

The 6th contains a proviso that a full and accurate description or specification shall be enrolled by the patentee in a specified time.

The 7th directs the patent to be construed in the most favourable manner for the inventor, and provides against inadvertency on the part of the clerk of the crown in enrolling the privy-seal bill.

Letters-patent then only grant the sole use of an invention for a certain time, provided that the statement in the declaration be true, that the title give a distinct idea of the invention, and that the specification be enrolled within a certain time mentioned in the patent, generally two months for England, four for England and Scotland, and six for the three countries together. This time depends on the attorney or solicitor general; a longer or shorter period being granted according to the extent or difficulty of the invention; in some instances two years have been allowed for specifying.

The object of the specification is twofold:—

First, it must show exactly in what the invention consists for which a patent has been granted, and it must give a detailed account of the manner of effecting the object set forth in the title. It must describe exactly what is new and what is old, and must claim exclusive right to the former: the introduction of any part that is old, or the omission of any part that is new, equally vitiates the patent.

In the second place, a patent is granted for a certain number of years on the condition that such full and accurate information shall be given in the specification as will enable any workman or other qualified person to make or produce the object of the patent at the expiration of that term without any further instructions. A specification is bad, if it does not describe the means of doing all that the title sets forth: it is equally bad if it describes the means of effecting some object not stated in the title: it is incomplete if it mentions the use of one substance or process only, and it can be proved that the inventor made use of another, or that another known substance or process will answer the purpose as well; and it is false if more than one substance or process are described as producing a certain effect, and it be found that any one of these is incompetent for the purpose. Patentees frequently render their patents invalid by claiming too much; thus, after describing one substance or process which will answer a certain purpose, they often conclude by some such expression as, 'or any other fit and proper means.' The following is an instance in which a patent was set aside by such an expression. In specifying a machine for drying paper by passing it against heated rollers by means of an endless fabric, the inventor, after describing one sort of fabric, the only one in fact which he used, went on to say that any other fit and proper material might be used. Now if he used any other means of effecting the object, such means should have been distinctly described. This alone rendered his specification incomplete; but, besides this, it was proved that no other fabric would answer the purpose, or rather that no other was known, and the patent was annulled accordingly. The cases which have been already mentioned as instances of bad titles will, by supposing the title to be good, be converted into instances of bad specifications, as the invalidity arises from the title and specification not agreeing with each other. It is not necessary to say anything further on the necessity of the greatest care in drawing up the specification.

The patentee may describe his invention just as he pleases, and he may illustrate such description by drawings or not; but he should be careful to use words in their most common acceptation, or if some technical use should have perverted their meaning, he should make it appear distinctly that he intends them to be taken in such perverted sense. Subjoined is the form of the other part of the specification.

'To all to whom these presents shall come greeting, I the said (patentee's name and residence) send greeting. Whereas her most excellent Majesty Queen Victoria, by her letters patent under the great seal of Great Britain, bearing date at Westminster, the day of , in the year of her reign, did give and grant unto me the said A. B., my executors, administrators, and assigns, her special licence, full power, sole privilege and authority, that I the said A. B., my executors, administrators, and assigns, and such others as I the said A. B., my executors, administrators, and assigns, should at any time agree with, and no others, from time to time, and at all times hereafter during the term of years therein mentioned, should and lawfully might make, use, exercise, and vend within England, Wales, and the town of Berwick upon Tweed, and also in all her said Majesty's colonies and plantations abroad (if such be the case), my invention of (here insert the title set forth in the letters patent verbatim); in which letters patent there is contained a proviso that I the said A. B. shall cause a particular description of the nature of my said invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, to be enrolled in her said Majesty's High Court of Chancery within calendar months next, immediately after the date of the said in part recited letters patent, reference being thereunto had may more fully and at large appear. Now know ye, that in compliance with the said proviso, I the said A. B. do hereby declare the nature of my invention and the manner in which the same is to be performed are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and the figures and letters marked thereon, that is to say, my invention consists (here insert the description of the invention). In witness whereof I the said A. B. have hereunto set my hand and seal this day of , 1840."

(Name and seal.)

'Taken and acknowledged
by A. B., party hereto,
the day of 1840,
at .

'Before me,

'B—— C——

'A master (or master extraordinary)
in Chancery.'

The specification being completed, it only remains to enrol it before 12 o'clock on the day of the expiration of the time allowed in the letters patent. All specifications are open to public inspection upon payment of a small fee, and books are kept at the Patent-office, Lincoln's Inn, which contain a list of all patents in force. These books may be inspected, by permission of the clerk, without any charge whatever.

Extension of Term of Letters Patent.—If a patentee finds that the time allowed him by the patent is not sufficient to remunerate him for the trouble and expense of his invention and patent, he may apply for an extension of the term. This used to require a petition to parliament, but by the before-mentioned Act of William IV., the patentee, after advertising his intention to apply for an extension of his patent in the manner required by the Act, may petition the king in council to that effect. Any person wishing to oppose the extension must enter a caveat at the Privy Council-office, and the petitioner and enterer of the caveat or caveats are heard by their counsel before the Judicial Committee, which reports to the king; and the king is authorised, if he shall think fit, to grant new letters-patent for the same invention for a term not exceeding seven years after the expiration of the first term. There were four or more such grants in the year 1837. The application must be made so as to allow time for the grant before the conclusion of the original term, according to 5 & 6 Wm. IV., c. 83; but this condition is somewhat modified by 2 & 3 Vic., c. 67.

Scotch and Irish patents are obtained by process similar to that described for England; the applications however are made to the respective law officers of each country.

The complicated nature of the proceedings in obtaining a patent has led to the establishment of a class of persons who make it their business to obtain patents for inventors; and in case of an intricate invention, it is far better for an inventor to employ one of these 'patent agents' than to run the risk of the errors and loss of time which may be occasioned by his inexperience. The fee charged by the clerks of the Patent-office, who act also as agents, is ten guineas, exclusive of the drawings and descriptions, which of course vary according to the difficulties of the subject; a small sum comparatively, when the loss of time and risk of a faulty title or specification are taken into consideration.

The time necessary for obtaining a patent is seldom less than two months, and frequently much longer. This is justly considered a great grievance, as the inventor is not secure until the great seal is attached, and no reason can be assigned for this delay, except that the patent passes unnecessarily through a great number of offices. The expense also is very heavy, and may be stated on an average at 120*l.* for England, with 5*l.* additional for the colonies, 100*l.* for Scotland, and 125*l.* for Ireland.

It is evident that there are many inventions which will not bear this outlay of capital, and the consequence is that the number of patents is much smaller than it would be under a more moderate arrangement. This may seem at first sight to be beneficial to the public, but such is not the case. The inventor, if he procure a patent, will take care that although he may be the party inconvenienced at first by the outlay, the public shall pay for it eventually; and, if he do not take out a patent, he will do all in his power to keep his invention secret for a longer time than the patent would have allowed. This circumstance has given rise to much of that jealousy which is so apparent among manufacturers; it has materially retarded the study of the arts, which are now fenced round with secrets and difficulties, and has been mainly instrumental in causing the great want which confessedly exists, of men conversant at once with the theory and the practice of mechanical operations.

The truth of these observations will be admitted by all who have been in any way connected with manufactures; but if any evidence be wanting to convince those who are not, the small number of patents taken out in England is quite conclusive. In 1837 the number of English patents was 254, and that of Scotch 132; the numbers in France and Prussia were much larger. Much has been said against the present law of patent, which in our opinion is unfounded in truth. There are difficulties connected with the title and specification which cannot perhaps be smoothed by any legislative enactments; but the obstacles which the law has placed in the way of inventors can be easily removed. There is nothing to prevent patents being granted in a quarter of the present time, and at a tenth part of the present expense. When this is done, the number of patents will rapidly increase; talent, which is inert for want of motive, will be called into action, and the workshop will no longer be closed against the philosophic inquirer.

PATENT. [Patterns.]

PATENTS. (Law.) The law relating to patents for inventions is founded on the 21 James I., c. 3, to which reference is made in the article Monopolies, and on the cases decided under that statute. It is also somewhat modified by the 5 & 6 Wm. IV., c. 83, and 2 & 3 Vic., c. 67.

The grant of a patent is not a thing which the subject can claim as a matter of right; it is the free gift of the crown. The form of the grant is by letters-patent, which, being the deed of the crown, are considered as of public record. The property acquired by the grant of a patent consists in the sole right of making a certain material thing, or of putting together material things in certain specified proportions or forms, in order to produce some definite result; and it also consists in the sole right of selling or allowing to others the use of such material thing or the means of producing such definite result. The grant of a patent endures for fourteen years from the date of the first letters-patent, or for such other time under fourteen years as the grant may contain. A patent cannot be held in any way so that more than twelve persons shall be interested in it. With the exceptions above mentioned, a patent is in all other respects like personal property, and of course may be sold or disposed of by will. The patentee may also grant licences to other persons to use his patent.

If the patent is infringed, the patentee or his assignee may bring his action for damages against the offender. The patentee or his assignee may also file a bill in equity against the infringers of the patent, and this is generally the best method of proceeding. On a bill being filed, immediately on the discovery of the infringement, which states a proper case and is supported by affidavits, an injunction may be obtained restraining the defendant from violating the patent until he puts in his answer or until further order of the court. The defendant may move to dissolve such injunction upon filing his affidavits, or he may make such motion on putting in his answer. When an injunction cannot be obtained either before the answer or upon the answer, and there is a doubt about the validity of the patent right or the infringement of it, the court will generally direct the defendant to keep an account of the proceeds of his manufacture, and will also either direct an issue to try the facts of validity or infringement, or leave the patentee to bring his action. If the patentee can establish the validity of his patent in a court of law, the court of equity will then grant an injunction against its infringement.

There is a further advantage in applying to a court of equity in the case of an infringement of a patent; the court can direct the trial at law in such manner as it thinks just, and can order parties to be examined on the trial who would not otherwise be competent witnesses; and when the alleged fact of infringement is done secretly, it can order the manufactory or workshop to be inspected.

Letters-patent may be invalid on various grounds, although the invention is actually a new one. These grounds, as appears from the statute of James (s. 6), may be, that they are 'contrary to the law,' or 'mischievous to the state by raising the prices of commodities at home,' or 'hurt of trade or generally inconvenient.' The proceeding by which a patent is cancelled is a writ of scire facias. The nature of the former of these two objections is shown in the article Monopolies, but it is a ground for cancelling a patent which can now hardly occur. The other ground, that of a patent being mischievous to the state, is also not likely to be of common occurrence; but if an issue were joined on facts which showed that a patent was mischievous to the state, such issue might be tried, and the patent might on that ground be declared void. The patent is of course also void, and may be cancelled if it is proved that the patentee is not the true and first inventor, that the object is not some 'new manufacture,' in the sense which judicial decisions have given to those words in the statute of James, or that the specification is not correct enough, or that the patent has not been properly obtained.

PATENT, LETTERS. [Letters Patent.]

PATENT YELLOW, a pigment composed of oxide and chloride of lead, or oxichloride of lead, for the preparation of which several processes have been proposed, as by decomposing common salt with litharge, or oxide of lead, and heating the residue, after separating the soda by washing. It is sometimes formed by heating together one part of chloride with 4 or 5 parts of oxide of lead, or by heating 10 parts of oxide of lead with one part of hydrochlorate of ammonia (sal ammoniac). It is of course constituted of different proportions of the compounds which form it, according to the method in which it is prepared. Since the introduction of chromate of lead, it is much less used than it was formerly.

PA'TERA, an open vessel approaching to the form of a cup, used by the Romans in their sacrifices, in which they received the blood of the victims, and with which they made libations. The word contains the same root as *pateo*: 'Patera ut et ipsum nomen indicio est, poculum planum ac patens est' (Macrobius, *Saturn*, v. 21). Virgil, in several passages of the 'Æneid,' alludes to the uses of the patera as—

Lib. vi. 248. Supponunt alii cultros, tepidumque cruorem
Suscipiunt pateris.
Lib. iv. 60. Ipsa tenens patera dextram pulcherrima Dido,
Candentis vaccæ media inter cornua fundit.
Lib. vii. 133. Nunc pateras libate Jovi.

On medals the patera is represented in the hands of several of the deities (Rasche, *Lexicon Universalis Rei Numariæ*, tom. iii., part ii., pp. 626, 627), and frequently in the hands of princes, to mark the sacerdotal authority as joined with regal power. The patera was of gold, silver, bronze, marble, glass, or earth. Such as had served for libations of wine or any other liquor at a funeral were usually deposited with the ashes of the deceased. Patella (that is, paterula) is the diminutive of Patera.

PATE'RCULUS, VELLE'IUS, was born about 19 B.C. He served in the army under Augustus, was made military tribune, and accompanied Tiberius in his German and Illyrian campaigns. On his return to Rome he was appointed successively quæstor, tribune of the people, and lastly prætor, which office he filled in the year of the death of Augustus. He wrote his abridgment of Roman history, which he addresses to the consul Vinicius or Vinucius Quartinus, A.D. 30, the year before the proscription of Sejanus. Paterculus is supposed to have lost his life at the time when Sejanus suffered, as he was a friend of that favourite, whom he praises in a rather fulsome strain towards the end of his work. The 'Historiæ Romanæ' of Paterculus consist of two books. The first begins with a brief notice of the early history of Greece after the Trojan war, and of the Greek colonies in Italy; it then mentions the foundation of Rome and the establishment of a senate by Romulus, after which there is an hiatus of 600 years, occasioned by the loss of that part of the MS. The work, as we have it, is resumed at the time of the war against Perseus, and briefly relates its result, as well as the destruction of both Corinth and Carthage. The second book is complete, and written more at length. It treats of the disturbances of the times of the Gracchi, of the civil wars of Marius and Sulla, of the wars between Cæsar and Pompey, of the second triumvirate, and lastly of the reign of Augustus, concluding with a panegyric on Tiberius and Sejanus. It serves in some measure as a substitute for the lost books of Livy. The writer expresses himself with tolerable fairness concerning the civil wars, until he comes to his own times, when he adopts a laudatory style towards the existing powers. His diction is elegant and fluent. The work of Paterculus has been often printed. The Bipont edition, 1780, with Dodwell's 'Annales Velleiani,' is a useful edition.

PATERNO. [CATANIA.]

PATHOLOGY (from πάθος, 'disease,' and λόγος, 'a discourse') is the science of diseases, and especially of those which affect men and animals which are the subjects of medical treatment.

For the perfect knowledge of the nature of a disease, the first circumstance to be determined is its cause; and this is commonly regarded as twofold. The predisposing cause or condition (for the term cause cannot fairly be used in this sense) is that state of any individual which renders him peculiarly liable to the attack of any or of some particular disease, of which another person or he himself at another time might be in little danger. Of these predisposing conditions the most important is hereditary disposition, by which an individual being constructed with the same peculiarities of internal and of external form and composition, which one or both of his parents possessed, is liable to the same diseases as they were. Such are the peculiarities of temperament or constitution with which each individual is born, and by which he is through life disposed to a peculiar character of disease; and such also are the special hereditary dispositions to scrofula, gout, insanity, some forms of asthma, and probably many more diseases. Other predisposing conditions are the peculiarities of constitution which are acquired in the course of life by particular modes of living. Each individual is adapted by habit and other circumstances to the conditions of climate, &c. in which he is placed, and is peculiarly liable to be affected by changes of these external conditions. A person of effeminate habits living carefully secluded from all excitants of diseases, is much more liable to be affected by exposure to any of them, than one whose frame by a hardy course of life is rendered comparatively invulnerable to all. Any means by which the strength of the body is reduced render it more liable to diseases of all kinds, and hence our idea of bodily strength is drawn not more from the muscular power of the individual than from his immunity from the effects of those circumstances which in others excite disease. There are also local peculiarities of individual organs of the body which render them especially liable to disease; such are the state bordering upon disease which is brought on by constant over-excitement of any organ; the condition of an organ which has once been affected with a disease, and which is commonly thenceforward particularly liable to a repetition of it; the state of the organs which at different periods of life renders one more than another liable to disease, so that the same excitant will be most likely to produce in the child an affection of the head, in the youth a disease of the chest, and in the adult or old person some disorder of the abdominal organs.

Any of these predispositions however may exist throughout life without the occurrence of actual disease; in order to produce disease, some more immediate or exciting cause is necessary. This excitant must be the more powerful the less the predisposition; but under whatever circumstances disease is produced, the predisposing condition of the patient may be expected to confer upon it a corresponding peculiarity of character. The exciting causes of disease are any changes of a certain extent in the conditions of the external circumstances in which man is placed. For example, a certain range of external temperature, a certain constitution of the atmosphere, a certain supply of pure food and drink, a certain amount of mental and bodily exertion, are circumstances essential to health, and alterations in any of them may produce disease, of which the nature and the seat will be determined in part by the predisposition of each individual, and in part by the peculiar mode of action of the excitant. Thus after the same exciting cause (for example, exposure to cold and damp), one person may have rheumatism, another pleurisy, a third ophthalmia, and a fourth may escape altogether unharmed. But there are other excitants of disease which prevail over all predisposition, and produce a certain character of disease, which the constitution of the patient can only slightly modify; such are the materials of all contagious and epidemic disorders, as influenza, small-pox, measles, &c., which produce in all whom they attack a similar affection. Many persons however escape from the effects of these excitants, and by long exposure become inured to them; hence the diseases of peculiar climates (endemics) affect foreigners much more than natives; but even in those persons in whom they do not produce disease, these excitants, which are excitants of disease in others, modify the characters of diseases that occur from any other source; and hence in the course of an epidemic all diseases have a tendency to assume some of the characters of that which is prevalent. Other excitants of disease, still more universal in their influence and more constant in their consequences, are all things which act immediately on the composition or construction of the body or of the blood, such as mechanical and chemical injuries, including poisons of all kinds.

The nature of a disease being determined by the condition of the individual and the exciting cause to which he is exposed, the next division of pathology is the study of the symptoms or signs by which the progress of a disease is marked, and by which in practice its nature is to be determined. Of these signs of disease, many are expressive of the altered condition of the part chiefly affected, as pain in a wound, or a local inflammation, coughing in a disease of the lungs, sickness in a disorder of the stomach; but a greater number are the expressions of an affection of other organs, which suffer in association with those primarily diseased; such are pain in the head when the digestion is disordered, coughing in diseases of the liver, sickness after violent blows on the head. Sometimes these secondary symptoms completely mask those immediately resulting from the primary disease; as when in a disease of the hip the chief pain is felt in the knee, or in hysteria any organ may appear disordered except that which actually is. These secondary symptoms are ascribed to what is called sympathy, an unsatisfactory expression indicating only the coincidence and probable connection of symptoms of disease in two organs, of which one only is supposed to be materially affected. Entire ignorance must be confessed of the nature and origin of many of these sympathetic or indirect symptoms of disease; as, for example, of the fever consequent on local injuries or acute local diseases, and of the hectic fever of many chronic affections; but it is probable that all symptoms will in time be found to depend either on some communication of excitement from one nerve to another through the medium of the spinal chord or brain, as in the reflex actions [NERVE], or on some change in the blood which affects both organs at once, or which, originating in the disease of one disturbs the functions of the other or of the whole body.

Whether directly or indirectly produced, all the symptoms of disease are only the perversions of the natural functions of the part affected, or appreciable changes in its structure; their value and meaning therefore can only be determined by a comparison with the same functions and structure in health: in other words, this, like all other parts of pathology, cannot be rightly studied without a constant reference to physiology. It is believed that an organ may be only functionally deranged; that is, that its several functions may be performed in a very unhealthy manner, without the existence of any material change in its structure and composition. These are called functional symptoms, but their number is probably much less than is generally believed, and it is most likely that they are limited to the variations to which the organs are subject by the changes in the mode and measure of the influence of the nerves upon them. For all other symptoms we must assume the existence of a substantial change in the part affected, or in the materials on which it has to act, although in many cases these changes are fugacious or inappreciable by our senses.

For a due performance of all the functions of organic life [LIFE], a healthy structure of each organ, and a healthy composition of the blood, on which they all act and all depend for their own maintenance, are alike necessary; a deviation from health in either will therefore produce the symptoms of disease; a conclusion in which the long continued disputes of the humoral pathologists, who ascribed all disease to the blood, and the solidists, who held all to depend on changes of structure, have at length merged. To these two kinds of alterations, and to perturbations in the distribution of the nervous influence, it is probable that the signs of all diseases may be referred; but from the peculiar and complicated nature of the animal body, and the universal connection between all its organs, no one of these changes can long continue without producing the others; and hence in diseases of any degree of severity the symptoms are commonly a mixture of the disorders of all the functions of the body, and the disorder of each is modified by the changes in all those circumstances on which its healthy state depended, as the condition of the blood, of the nervous influence, &c. Neither are the symptoms in any case constant phenomena; for the influences of all external circumstances upon a diseased body are very different from those which they exert upon the healthy body, and many things which were necessary to health are supporters of disease, as the usual amount of food, of bodily and mental exertion, &c.; so that exclusion from them becomes necessary, and this again further modifies the performance of the disordered functions.

The history of a disease is completed by the process of natural recovery or by the observation of the changes in the structure of the body which it produces. The influence of remedies cannot justly be considered as a branch of pathology; though most important for their utility, still, in their relations to the natural history of a disease, medicines can only be regarded as interfering circumstances, or as the means of experiments for the determination of the relation of the diseased body to particular agents, by which the nature of the disorder affecting it may be sometimes ascertained.

The recovery from disease is an example of the exercise of that power by which the body can make unusual efforts to prevent its own destruction: this has been called the vis medicatrix naturæ, or curative force of nature. It is exerted in many cases in which disease cannot be said to exist, but where rather there is an exaggeration of health; as, for example, when a muscle subjected to unusual exertion and an unusually great amount of waste not only repairs its loss, but actually becomes larger and stronger, so that it can bear the same amount of constant waste better than at first; or as when a person is exposed for a time to cold in bathing, the speedy consequence is an increased warmth of the surface. The term reaction is applied to phenomena of this kind, and it may be said that reaction takes place whenever any injurious influence is applied to the body. In simple cases the reaction effects at once a restoration to health, as in the instances above mentioned; in others the reaction is itself the most prominent feature of the disease, as in fever and inflammation.

The recovery from disease is rarely perfect. Although no visible change may be left behind, yet the part diseased is commonly for ever after weak, that is, more than usually liable to the same or to some other disease. It is probable this liability is owing to some morbid change in the structure of the part inappreciable by our present means of examination; in more distinct cases, when any part has been severely diseased, we never see a perfect restoration of its healthy structure and form. Even in those tissues that are most easily repaired, there is not an actual reproduction of the injured structure.

The period occupied in the progress of a disease to recovery or death is the basis of the chief division of acute and chronic diseases. The severity of the symptoms may in both cases be the same; but in general those of chronic cases are less prominent than those of acute cases.

When the disease terminates fatally, or when death takes place from any other cause at a distant period from its occurrence, we obtain perhaps the most valuable because the most certain part of pathological knowledge, that of the material effects which the morbid process has produced. This, the study of morbid anatomy, is often specially called pathology. By the examination of the altered parts and a comparison of the changes of structure which they present with those which are known by observation of external diseases or by experiment to result from certain leading morbid processes, as inflammation, &c., we are enabled to determine the nature of that which had existed beyond the limit of our senses, and thus to appreciate correctly the meaning of the several symptoms which had marked its progress during life, and the powers and modes of action of the circumstances to which it owes its origin. The practical value of such knowledge is the power which it affords of determining during life the nature of each disease, and the appropriate remedy for each.

PATINA, a name given to the rust or ærugo of coins and medals. Pinkerton (*Essay on Medals*, edit. 1789, vol. i., p. 163) says, 'nothing contributes so much to the conservation of brass or copper coins as that fine rust, appearing like varnish, which their lying in a particular soil occasions. Gold admits no rust but iron mould, when lying in a soil impregnated with iron. Silver takes many kinds, but chiefly green and red, which yield to vinegar. For in gold and silver the rust is prejudicial, and to be removed; whereas on brass and copper it is preservative and ornamental: a circumstance remarked by the antients, as the 'pocula adorandæ rubiginis' of Juvenal may prove, and that exquisite Greek phrase which terms patina *χάλκου ἄνθος*, 'the flower of brass.' This fine rust, which is indeed a natural varnish, not imitable by any power of human art, is sometimes a delicate blue, like that of a turquoise, sometimes of a bronze brown, equal to that observable in antient statues of bronze, and so highly prized; and sometimes of an exquisite green, a little on the azure hue, which last is the most beautiful of all. It is also found of a fine purple, of olive, and of a cream colour, or pale yellow: which last is exquisite, and shows the impression to as much advantage as paper of cream colour, used in all great foreign presses, does copper-plates and printing. The Neapolitan patina is of a light green; and, when free from excrescence or blemish, is very beautiful. Sometimes the purple patina gleams through an upper coat of another colour, with as fine effect as a variegated silk or gem. In a few instances a rust of deeper green is found; and it is sometimes spotted with the red or bronze shade, which gives it quite the appearance of the East Indian stone called blood-stone. These rusts are all, when the real production of time, as hard as the metal itself, and preserve it much better than any artificial varnish could have done, concealing at the same time not the most minute particle of the impression of the coin.'

PATKUL. [Charles XII.]

PATMOS, a small island, one of the Sporades, near the south-western coast of Asia Minor, and about 30 miles south of Samos. It is now called Patino. Patmos is chiefly known as having been, according to the early tradition of the Christian church, the place of exile of the apostle St. John, who is said to have written his *Revelations* there. The island is a continuous rock about 15 miles in circumference, rugged and barren, except a few fertile spots; the coast is high, and forms many capes, with several good harbours, of which the most frequented lies on the north-east side. The only town is situated on a high rocky eminence rising abruptly from the sea; it consists of about 400 houses, which, with about 50 more at La Scala, or the landing-place, are the only habitations in the island. In the middle of the town, and in the highest part of it, is the monastery of St. John, which was built by Alexius Comnenus. It is a massive building flanked with towers, and looks like a fortress. About half way up the mountain, between La Scala and the town, is a natural grotto, in which the natives say that St. John wrote his *Revelations*; and they have built a small church over it. (Tournefort; Hilaire, *Voyage dans la Grèce*.)

PATNA, the modern capital of Bahar, is situated on the south bank of the Ganges, in 25° 36′ N. lat. and 85° 15′ E. long. The city, within the walls, is about a mile and a half long, from east to west, and about three-quarters of a mile broad from north to south. This part of the city is very closely built, but the suburbs are of far greater extent, and the buildings altogether extend for nine miles along the Ganges, with a breadth of about two miles; but the buildings outside the walls are irregularly placed, and with considerable spaces between them. The greater part of the houses are of mud, the rest are built with brick, and nearly all the roofs are tiled, a few only being thatched. The number of houses, according to Dr. Buchanan Hamilton, was 52,000, in 1811, and the total population 312,000, about two-thirds of whom were Hindus, and the remainder Mohammedans; the number of Europeans is very small.

The city is the seat of a considerable banking trade. In 1811 there were 24 bankers established, several of whom had agents at the principal commercial cities of Hindustan. A considerable trade is also carried on in opium, rice, and saltpetre, as well as in cotton cloths and silk goods.

Patna is distant 155 miles from Benares, from Lucknow 316 miles, from Agra 544, and from Delhi 661 miles, as travelling distances.

PATRAS, the antient PATRÆ, a town on the north coast of the Morea, about six miles south-west of the entrance of the Gulf of Lepanto. It stands on a ridge about one mile long, of which the acropolis, or citadel, crowns the summit, and commands the view of a fine and fertile plain which stretches along the sea-coast. Mount Voidhia, one of the high summits of the Morea, rises above the ridge on which the town is built. The plain of Patras produces a great quantity of currants, which form an article of export. The hills are planted with vines, from which a good red wine is made. Many of the houses are surrounded by gardens, with orange, fig, pomegranate, and other fruit trees, [illegible] the houses themselves are ill built and mostly of wood. (Leake's *Morea*.) Previous to the Greek revolution, Patras was the most thriving town of the Morea, being the emporium of the trade of that peninsula as well as of western Greece. It contained about 10,000 inhabitants, mostly Greeks, and had consuls of most European nations. The war of the Greek revolution ruined the town; the citadel, which was in the hands of the Turks was repeatedly attacked, but never taken by the Greeks, and it capitulated at last, in 1828, to the French auxiliary force. Since that time Patras has somewhat recovered; and it is said to contain at present about 8000 inhabitants. The eparchy or district of Patras contains 112 villages besides the town.

Patrae was one of the twelve cities of Ægialeian Ionia, or Achaia, and is the only one that still exists as a town. [ACHAIA.] After the battle of Actium, Augustus sent a colony to Patrae. The present town occupies the same site as the old one, but few remains of antiquity are visible, except some statues in the acropolis, which are noticed by Leake.

PATRIARCH (*πατριάρχης*, the head of a family), a title given to the heads of families in the early history of the human race, and more particularly to the ancestors of the people of Israel down to the time of Moses, and especially applied to the twelve sons of Jacob, as the ancestors of the twelve tribes of Israel.

There is a book in existence entitled 'The Testaments of the Twelve Patriarchs, the Sons of Jacob,' containing what profess to be the dying admonitions of the patriarchs to their children, and their predictions of the future fortunes of their descendants. This work has been published in Greek by Grabe, from MSS. in the universities of Oxford and Cambridge (*Spicileg. Patr.*, tom. i., p. 129), and again by Fabricius (*Cod. Pseudepigr. Vet. Test.*, 1713, p. 496); it was translated into Latin by Grosthead, bishop of Lincoln (8vo., Haganoæ, 1532), into French by Francis Mace, and into English by Whiston, in 'A Collection of Records belonging to the Old and New Testament,' London, 1727-8. Whiston has a dissertation to prove the authenticity of the work, but his arguments are neither worth repeating nor refuting. It is undoubtedly spurious. There is no evidence to prove that it ever existed in Hebrew, and the earliest reference to it by any ancient writer is one by Origen, who expressly asserts that it formed no part of the canon. It contains allusions to and quotations from passages both in the Old and New Testament, and the writer evinces an amount of knowledge of Christianity which was not possessed even by Christians till some time after the ascension of Christ, much less by the twelve sons of Jacob. Lardner, who has a very good notice of the work (*Credibility*, pt. ii., ch. xxix., s. 2), gives the following summary of the allusions to Christianity contained in the work:—'Thus this author, in an indirect manner and in a pretended prophetical style, bears a large testimony to the Christian religion, to the facts, principles, and books of the New Testament. He speaks of the nativity of Christ, the meekness and unblameableness of his life, his crucifixion at the instigation of the Jewish priests, the wonderful concomitants of his death, his resurrection, and ascension. He represents the character of the Messiah as God and man, the Most High God with men, eating and drinking with them, the Son of God, the Saviour of the world, of the Gentiles, and Israel, as eternal high priest and king. He likewise speaks of the effusion of the Holy Spirit upon the Messiah, attended with a voice from heaven; his unrighteous treatment by the Jews, and their desolations and the destruction of the Temple upon that account; the call of the Gentiles; the illuminating them generally with new light; the effusion of the Spirit upon believers, but especially, and in a more abundant measure, upon the Gentiles. Here is little notice taken of our Lord's miracles: however, he speaks of the Messiah as a "man who renews the law in the power of the Most High," in which expressions the working of miracles seems to be implied. Here are also passages which seem to contain allusions to the gospels of St. Matthew, St. Luke, and St. John, the Acts of the Apostles, the Epistle to the Ephesians, first to the Thessalonians, first to Timothy, the Epistle to the Hebrews, the first Epistle of St. John, and the book of the Revelation; and, as far as was consistent with his assumed character, the author declares the canonical authority of the Acts of the Apostles and the Epistles of St. Paul. Lastly, he recommends the reading of the Holy Scriptures.' (Lardner's *Works*, vol. ii., p. 363, ed. of 1831.) In a passage in the Testament of Benjamin (sec. 9) the prediction in *Gen.*, xlix. 27, seems to be applied to the apostle Paul. Others of the early Christian writers also apply that text to Paul. In these Testaments the canonical Scriptures are never quoted by name. The only books which are so quoted are the 'Scripture of Enoch, the Tables of Heaven' [ENOCH], and the 'Scripture of our Fathers.'

The author of this book was probably a converted Jew, though not, as Cave supposed, a Judaizing Christian. It seems to have been written about the end of the second century.

PATRIARCH, in Church History, was the ecclesiastical chief of a diocese, which included several provinces. It is not known at what time this title was introduced into the church; but before the fourth century the bishops of Rome, Antioch, and Alexandria, had obtained a degree of preeminence over the other bishops. In the time of Constantine the Great the bishop of Constantinople was made to rank with the three just mentioned; and either then or not long after, the title of patriarch was given to these four prelates. The number of these dignitaries was increased in the fifth century. The patriarch of Constantinople reduced under his jurisdiction those of Antioch and Alexandria, and obtained the title of 'Universal Patriarch.' The bishop of Rome was called '*Prince of the Patriarchs*.' The struggles of the patriarchs of Rome and Constantinople for supremacy was the chief cause of the separation between the Eastern and Western churches.

The powers of the patriarchs are thus described by Mosheim:—'They alone consecrated the bishops who lived in the provinces that belonged to their jurisdiction. They assembled yearly in council the clergy of their respective districts, in order to regulate the affairs of the church. The cognizance of all important causes, and the determination of the more weighty controversies, were referred to the patriarch of the province where they arose. They also pronounced a decisive judgment in those cases where accusations were brought against bishops. And lastly, they appointed vicars, or deputies, clothed with their authority, for the preservation of order and tranquillity in the remoter provinces.' (Mosheim, *Ecc. Hist.*, Cent. v., pt. ii., chap. 2.) There were however provinces of the empire which were exempt from their jurisdiction.

The Greek church is at present governed by four patriarchs, namely, those of Constantinople, Jerusalem, Antioch, and Alexandria.

PATRICIANS (*Patres, Patricii*, in Latin) was the appellation of the members of the original houses or gentes, of which the Roman populus, the ruling power in the community, was at first composed, and of their descendants, either by blood or adoption. The houses are said to have been three hundred. Each house became subdivided into several families, which were distinguished by a surname, in addition to the name of the gens, which was common to all, like that of a Scottish clan. Thus the gens Cornelia comprised the families of the Scipiones, the Lentuli, the Sullæ, &c. The families composing a gens were not necessarily related by consanguinity, for individuals might be adopted into a gens. The definition of a gens by Scaevola (Cic., *Top.*, c. 6) is, that the members bore a common name, were descended from freemen, without any stain of slavery among their ancestors, and had never incurred any legal disability; they had common sacred rites, or sacrifices appointed for stated days and places. When a family became extinct by default of heirs in the male line, its property reverted to the gens of which it formed a part. Gentile and patrician were therefore synonymous. Freedmen and their descendants belonged to the gens of which they bore the name, but they had not the rights of the gens, that is to say, the gentile rights. Natives of the confederate towns of Latium coming to settle at Rome attached themselves to some gentile family, the head of which was styled their patron, and they were styled his clients. [CLIENT.]

The members of the senate, the consuls, and the pontiffs were, in the first ages of the republic, chosen exclusively from among the patricians, until the year 365 B.C., when Licinius carried his rogations, by which the plebeians were admitted to the consulship, as well as to the custody of the Sibylline or sacred books. [LICINIUS STOLO.]

When the plebeians became eligible to all the offices of the state, a new nobility was formed, consisting of those who had filled the offices of consul, prætor, or curule ædile, and this nobility was transmitted to their posterity with the 'Jus imaginum,' or the right of setting up in their houses the images of their ancestors. Still a distinction in opinion continued to prevail in favour of the patricians, or older nobility, as distinguished the plebeian from families.

When Constantine transferred the seat of the empire to his new city, he established there a new senate and a new patrician order, the members of which were appointed by the emperor. After the fall of the Western Empire, the officers sent by the Byzantine emperors to administer the provinces of Italy subject to them, were chosen from among the patricians of Constantinople. Thus we read in the history of the dark ages, of the 'patrician of Rome,' meaning the governor or representative of the Eastern emperor in that city, and the title was afterwards assumed by Charlemagne and his successors.

At Venice the name of patrician was given to the members of the great council, or supreme legislature, and their descendants, and their names were registered in the golden book. After the decree of February, 1297, called 'La serrata del maggior consiglio,' no new member was introduced into the council, but all descendants of those who had once sat in the great council, on arriving at twenty-five years of age, were by right members of the sovereign assembly, and patricians of Venice. 'Patrizio Veneto' was a title of nobility, considered equal to that of any feudal noble not of a sovereign house.

In other parts of Italy, such as Genoa and Rome, the word patrician was and is still used in common language to denote a member of the hereditary nobility, independently of any feudal title.

PATRICK, SIMON, born 1626, died 1707, a prelate of the English church, distinguished as the author of many excellent works in practical divinity and expository theology. He was a native of the town of Gainsborough, educated in Queen's College, Cambridge, and the chief scene of his public labours as a clergyman was the parish of Saint Paul's, Covent Garden, of which he was rector, till higher preferment was bestowed upon him; he became dean of Peterborough in 1679, bishop of Chichester in 1689, and bishop of Ely in 1691.

The titles of his writings will show at once their nature and tendency to have been to promote Christian piety and to foster the spirit of devotion. In their day they were much esteemed, and they are still valued as among the best helps to devotion by good and pious Christians: 'Heart's Ease,' 'Parable of the Pilgrim,' 'Exposition of the Ten Commandments,' 'The Friendly Debate,' 'The Christian Sacrifice,' 'The Devout Christian,' 'Advice to a Friend,' 'Jesus and the Resurrection justified,' 'The Glorious Epiphany.' Beside these, there are his Paraphrase and Comments on the books of the Old Testament, which have been several times reprinted.

These writings are the foundation of Bishop Patrick's reputation. He also completed and published Gunton's 'History of the Church of Peterborough.'

PATRICK, ST., the apostle of Ireland, was born, according to Usher and Tillemont, in the year 372. The former places his death in 493, but Tillemont about the year 455. Nennius, published by Gale, says he died fifty-seven years before the birth of St. Columba, consequently in 464.

The two principal antient Lives of St. Patrick are, that compiled by Jocelin, a Cistercian monk, in the twelfth century, who quotes four lives written by disciples of the saint; and that by Probus, who, according to the Bollandists, lived in the seventh century. In both, legendary tales are intermixed. The chief authentic information we possess concerning this saint is obtained from his own writings, his 'Confession,' and a letter which he addressed to Corotic, a prince in some part of Wales, after the Britons had been abandoned by the Romans, who made a descent upon Ireland during St. Patrick's mission to that country. From the 'Confession' we learn that he was born in a village called Bonaven Taberniæ, supposed to be the town of Kilpatrick at the mouth of the Clyde in Scotland, between Dumbarton and Glasgow. He calls himself both a Briton and a Roman, meaning of mixed extraction; and says his father was of a good family, named Calphurnius. His mother was Concha, or Conchessa, who, according to some writers, was niece to St. Martin of Tours. According to Nennius (abbot of Bangor, A.D. 620), St. Patrick's original name was Maur; that of Patricius was given to him by Pope Celestine when he consecrated him a bishop, and sent him as a missionary into Ireland, A.D. 433.

Jones, in his 'Historical Account of the Welsh Bards,' fol., Lond., 1794, p. 13, says St. Patrick was born in the vale of Rhos in Pembrokeshire.

His festival is marked on the 17th of March in the Martyrology of Bede.

(See the *Acta Sanctorum* of the Bollandists, 'Month of March,' vol. ii., p. 517-592; Butler's *Lives of the Saints*, 8vo., Dublin, 1779, vol. iii., p. 176-186.)

PATRIMONY OF ST. PETER. [VITERBO.]

PATRI'NIA, a genus of plants of the natural family of Valerianeæ, consisting of a few species found in Siberia, China, and Japan, and to which the long-famed spikenard of the East was referred by Mr. Dora, but which has been formed into a new genus, *Nardostachys*. [SPIKENARD; SWEET CANE.]

PATRISTIC THEOLOGY. [THEOLOGY.]

PATRON. [BENEFICE; PARISH.]

PATRO'NUS, derived from *pater*, a 'father,' as *materna* is formed from *mater*, a 'mother.' The relation of Patron and Client (*cliens*) in antient Rome is discussed in the article CLIENS; but the relation between a freedman (*libertus*) and his patronus requires a few words of explanation.

In the Roman polity persons were divided, with respect to status or condition, into freemen (*liberi*) and slaves (*servi*). Freemen were again divided into persons who were born in a state of freedom (*ingenui*), and those who had been manumitted (*libertini*). A manumitted slave was called *libertus*, that is, *liberatus*, 'freed,' and his master who manumitted him became his *patronus*. The slave who was manumitted received the gentile name of his patronus (Lactant., iv. 3); and accordingly we read of a freedman of Pompey called Pompeius Lenæus (Plin., *Hist. Nat.*, xxv. 3), and of a freedman of Cicero called Laurea Tullius (Plin., *Hist. Nat.*, xxxi. 3), and of another called Tullius Tiro, who is frequently mentioned in Cicero's letters. The relation between patronus and libertus resembled in many respects that between patronus and cliens; but it appears that their mutual rights and obligations were rather regulated by public opinion than fixed by any positive enactment. The patronus on the one hand was bound to take the libertus under his protection; and the libertus on his part was bound to assist his patronus by every means in his power, but the only case in which he was compelled by the law to do so, was when the patronus or his children had become too poor to support themselves. In such a case, if the patronus or his children proved to the satisfaction of the governor of the province (*præses*) their necessitous condition, he or they received from their libertus a sum of money every month for his or their support. (*Dig.* xxv., tit. 3, s. 9.)

The most important part however of the connection between the patronus and the libertus was the right which the former had in certain cases to the property or a portion of the property of the latter upon his death. This right was founded upon the fact, that the law regarded the patroni as the adgnati of their liberti, and consequently they succeeded to the property like any other adgnati. By a law of the Twelve Tables, if the libertus died intestate and left no heir (*suus heres*), the patronus succeeded to his property. (Gaius, iii. 40; Justinian, *Institut.*, iii., tit. 7, s. 1.) If the heir was a son born of his own body (*naturalis*), no one had a right to complain; but it appeared to the Romans a great injustice that an adopted son or daughter, or a wife (*in manu*), should deprive the patron of his right to the property. This injustice was remedied by the prætor's edict, by which it was regulated that natural sons, whether in the power of their father at the time of his death, or whether they had been emancipated or adopted by another person, provided they had not been disinherited, should alone be a bar to the patron's right to the property, and that if a libertus who had no natural sons made a will, he was obliged to leave half of his property to his patronus; and if he left none of his property, or less than half, the bonorum possessio of half was given to the patronus, even against the words of the will; if the libertus died intestate leaving an adopted son, a wife (*in manu*), or a daughter-in-

[illegible] *filii quasi*, half of the property was also given to the patronus. (Gaius, iii. 40, 41; *Institut.*, iii., tit. 7, s. 1; Ulp., *Fr.* xxvii. 1; Dion Cass., li. 15.)

By the Lex Papia the rights of patrons to the property of their rich freedmen were still further increased. By this law it was enacted, that if a libertus died leaving property to the value of 100,000 sesterces, a portion of his property (*virilis pars*) went to his patronus, whether he had made a will or died intestate, provided he had fewer than three children. If he left only one son or one daughter, half of his property went to his patronus, as if he had died leaving no son or daughter; if he left two children, a third went to the patronus, but if three, the patronus had no claim to any portion. (Gaius, iii. 42; *Institut.*, iii., tit. 7, s. 2.)

With regard however to the property of a liberta, the ancient law sufficiently protected the rights of the patronus, and he therefore had no occasion to have recourse to the edict of the prætor. For since the patronus was the tutor of the liberta, she could not make a will without his consent and consequently could not leave her property to any one else. (Gaius, iii. 43; Ulp., *Fr.* xxix. 2.) The Lex Papia however set free a liberta who had brought forth four children from the tutela of her patronus. (Gaius, iii. 44; Ulp., *Fr.* xxix. 3.)

The patrona, previous to the passing of the Lex Papia, only had the same right to the property of the libertus as was granted to the patronus by the Twelve Tables, and could not, like the patronus, obtain by the prætor's edict the half of the property of a libertus who had left only an adopted son or a wife or daughter-in-law. By the Lex Papia however, an ingenua patrona, who had brought forth two children, and a libertina patrona, who had brought forth three, obtained almost the same rights as the patronus possessed by the prætor's edict; and an ingenua patrona who had brought forth three children obtained the same privileges as were given to the patronus by that law; but a libertina patrona in no case obtained the rights granted to the patronus by the same law. (Gaius, iii. 49, 50; Ulp., *Fr.* xxix. 5, 6.)

The rights of a patronus to the property of a libertus only extended to his direct heredes, sons, grandsons, great-grandsons, &c., and never belonged to his collateral heirs (*extranei heredes*). (Gaius, iii. 58.) A patronus was able to assign a libertus (*adsignare libertum*) to one of his sons to the exclusion of his other children, so that on the death of a libertus, the son to whom the libertus had been assigned was alone entitled to the property, which was due to the patronus by the jus patronatus. (*Institut.*, iii., tit. 8; *Dig.*, 38, tit. 16, s. 107.)

All the preceding remarks respecting the succession of the patronus to the property of the libertus, only apply to the property of those liberti who were Roman citizens. Those liberti who were Latini [LATINUM JUS], or Dediticii, had in fact no power over the disposal of their property. The Latini liberti had the privileges of freemen while alive, but 'they lost their life and their liberty at the same time,' and their property, like the *peculia* of slaves, came by the Lex Junia to the persons who had manumitted them (Gaius, iii. 56; *Institut.*, iii., tit. 7, s. 4.) The succession to the property of the liberti Latini differed also in many other important particulars, which Gaius has pointed out (iii. 57-62), from the succession to the property of those liberti who were Roman citizens. By a decree of the senate passed in the reign of Claudius during the consulship of Lupus and Largus, it was enacted that the property of the Latini should pass first to those who had manumitted them and their children not disinherited by name, and afterwards to their proper heirs. (Gaius, iii. 63; *Institut.*, iii., tit. 7, s. 4.) By a constitution of Trajan, it was enacted that if a Latin libertus obtained from the emperor the jus Quiritium without the knowledge or against the will of his patronus, he should enjoy the privileges of a Roman citizen while he lived, but should be regarded as a Latinus at the time of his death, and should have no power of leaving his children as his heredes; and that he should only be allowed to make a will so far as to leave his patronus his heir, or if the latter were unwilling to become his heir, of substituting another in his place. (Gaius, iii. 72.) This constitution however was a little altered by one of Hadrian, who gave with certain conditions the same privileges to those Latini who had obtained the jus Quiritium from the emperor, as if they had obtained it by a decree of the senate or the Lex Ælia Sentia. (Gaius, iii. 73.)

These laws were however very much altered by Justinian. He gave to the liberti Latini and Dediticii the same privileges as those liberti possessed who were Roman citizens. He also enacted, that if a libertus or liberta left less property than amounted to the value of 100 aurei, the patronus had no claim to any portion of the property, provided they made a will; but if they died intestate, leaving no children, then the patronus succeeded to the property by the law of the Twelve Tables. If the property of the libertus or liberta was of more value than 100 aurei, and they left children, the patronus had also no claim to any part of the property; but if those liberti or libertæ who left no children died intestate, the patronus succeeded to the whole of the property, and if they made a will without leaving any part of their property to the patronus, then he had a right to a third of the property, and not to a half, as was formerly the case. (*Institut.*, iii., tit. 7, s. 3.)

(Gaius, iii. 39-76; Ulpian, *Fragm.*, xxvii. 1-5; xxviii. 7; xxix. 1-7; *Institutiones*, iii., tit. 7, *De Successione Libertorum*; tit. 8, *De Adsignatione Libertorum*; *Digest* 37, tit. 14, *De Jure Patronatus*; 38, tit. 2, *De Bonis Libertorum*; 38, tit. 4, *De Adsignandis Libertis*; *Collatio Legum Mosaic. et Roman.*, xvi, 8, 9; Unterholzner, *Ueber das patronatische Erbrecht*, in the *Zeitschrift für Geschichtliche Rechtswissenschaft*, 5th vol., 1st part, Berlin, 1823; and the articles CLIENS, LATINUM JUS, and LIBERTINUS, in this work.)

PATRO'NYMIC (*πατρωνυμικόν*) is a name given by grammarians to those words which express the name of a person's father or ancestor. Thus Achilles is called Pelides (the son of Peleus), Agamemnon is styled Atrides (the son of Atreus), &c. In the English language we have no words of this description, but in Sanscrit and Greek they are very common, especially in Sanscrit, which has as many as thirteen different terminations to form such words, namely, *a, âki, âyana, âyani, âyanya, ineya, iya, îya, êra, aira, [illegible], ki, ya*. In Greek the most common masculine termination is *ides*, as *Cecrop-ides*, a descendant of Cecrops; some patronymics are formed by adding *ion*, as *Kron-ion*, the son of *Kronos*, &c. Feminine patronymics in Greek are commonly formed by adding *id* (in the nominative *is*), as *Tantal-is*, gen. *Tantal-id-os*, the daughter of Tantalus. In Lithuanian some patronymics are formed by adding *na*, as *Janow-na*, the son of Janow or John (Pott's *Etymologische Forschungen*, vol. ii., p. 579); which termination may perhaps be connected with the Latin *anus*, which forms such patronymics as *Octavi-anus*, one of the family of Octavius, *Æmili-anus*, one of the family of Æmilius, &c.

PATTERNS. Connected with the subject of patents is the copyright of designs. By a recent Act of parliament (2 Vic., c. 17), the inventor or purchaser or proprietor of any design, 'for a pattern or print to be either worked into, or worked on, or printed on, or painted on, any article of manufacture being a tissue or textile fabric; or for the modelling, or the casting, or the embossing, or the chasing, or the engraving, or for any other kind of impression or ornament on any article of manufacture; or for the shape or configuration of any article of manufacture,' may secure the sole use and benefit of such design to himself for twelve months, and if it be applied to metal work, for three years.

He must take or send to the office of the Registry of Designs, Wellington-street North, Strand, three copies or drawings of his design; one of which will be filed by the registrar, a second left at the disposal of the Board of Trade, and the third returned to the party registering, with a certificate, which certificate is by the Act held to be evidence of registration.

Every article manufactured according to such design must have thereon the name of the first registered proprietor, the number of the design in the register, and the date of the registration.

Any person pirating a design thus protected is liable to a penalty of from 5*l.* to 30*l.* for each offence, which may be recovered by an action at law, or by summary proceeding before two magistrates.

Registered designs may be transferred from one person to another, in which case the latter is entitled to be registered as the proprietor. Printed forms of such transferences are supplied at the office.

The following are the fees ordered to be paid by the comsury:—For registering each design, including certificate, 1*l.* 1*s.*; if metallic substances, 3*l.* 3*s.*; for each folio page of the certificate after the first, 5*s.*; in case of loss of certificate, transfer of design, demand for search, &c., search for design, 5*s.*; registering transfer of design, either total or partial, 1*l.* 1*s.*; certifying design subsequent to registration, 1*l.* 1*s.*

This Act applies to designs for all sorts of fabrics and manufactures, with the exception of lace and those provided for under the calico printers' Acts, 27 Geo. III., c. 38; 29 Geo. III., c. 19; 34 Geo. III., c. 23; 2 Vic., c. 13. By these Acts the inventor of a new pattern may restrain any one from copying his design for three months, by printing or stamping his name upon the end of each piece of the fabric.

All communications with the Office for Registration of Designs, including the designs themselves, pass free through the General Post, whatever may be their weight. The fees or a money-order may be sent and the certificate received in the same manner free of all expense.

PATTI. [MESSINA.]

PATUXENT. [MARYLAND.]

PATZCUARO. [MEXICAN STATES.]

PAU, a town in the south of France, capital of the department of Basses Pyrénées: it is on the right bank of the Gave de Pau, above 400 miles in a direct line west-south-west of Paris, or 497 miles by the road through Orléans, Limoges, Bordeaux, Roquefort, and Aire; in 43° 18′ N. lat. and 0° 23′ W. long.

Pau owes its origin to a castle erected here by the princes of Béarn, in the ninth or tenth century, as a place of security from the hostilities of the Saracens. The intended site of the castle was marked out with stakes, and from the Béarnais word *paou* (in French *pieu*), a stake, the town takes its name. It sprung up and increased gradually under the shelter of the castle, which continued to be the residence of the princes of Béarn until the accession of Henri IV. to the throne of France. Louis XIII. established a parliament in the town, and Louis XIV. founded a university, but it never attained any degree of celebrity. The town is situated on a height, and is divided into two parts by a deep ravine crossed by a bridge: the principal part of the town is on the south side of the ravine. There is a suburb, called 'the Lower Town,' on the bank of the Gave de Pau, at the foot of the height on which the town stands. Pau is well laid out; the houses are tolerably well built, and are covered with a thick coating of mortar or cement. The poorer houses in the suburbs are chiefly of pebbles laid in very hard mortar. The principal object of interest is the castle, the birthplace of Henri IV., on the west side of the town. This building, which was erected in place of the original castle of the Béarnais princes, is an irregular Gothic structure, striking from its vastness and interesting from its historical associations. It is kept in repair by the government. The room in which Henri was born and the tortoise-shell which served for his cradle are still shown. The castle commands a beautiful and extensive prospect, and has a fine park attached to it. There are two places or squares in Pau, that of La Comédie, the larger and finer of the two, and the Place Royale, planted with trees and adorned with a fine pedestrian statue of Henri IV. in bronze.[*] There are also several promenades.

There is a good bridge over the Gave de Pau, communicating between the suburb of 'the Lower Town' and the neighbouring town of Jurançon, celebrated for its wines. There are a court-house, a market-house, with a fountain in front of it, and several promenades. The population of Pau in 1831 was 10,597 for the town, or 11,285 for the whole commune; in 1836, 12,607 for the whole commune. The principal branches of industry are the manufacture of carpets and of linens, especially table-linen and Béarnais handkerchiefs, dyeing, and tanning. Trade is carried on in hams, salted legs of geese, and other provisions, wines, cotton yarn, cotton goods, and coarse woollens. There are two good weekly markets and three yearly fairs.

Pau has several fiscal government offices, a Cour Royale, or court of justice, having jurisdiction over the three departments of Basses Pyrénées, Hautes Pyrénées, and Landes; an Académie Universitaire, whose circuit is coextensive with the jurisdiction of the Cour Royale; a royal college, with a museum and a collection of philosophical instruments, a public library of 14,000 volumes, a collection of pictures, a drawing-school, an agricultural society, a theatre, and public baths.

Pau was the birthplace of the Jesuit Pardies, a good geometrician and astronomer; and of Bernadotte, the present king of Sweden.

The arrondissement of Pau comprehends an area of 6[illegible] square miles: it is divided into eleven cantons or districts, each under a justice of the peace; and comprehends 204 communes, with a population, in 1831, of 117,865; in 1836, 122,404.

PAUL, ST., the great Apostle of the Gentiles, originally called Saul, was born at Tarsus in Cilicia. Though a Jew of the tribe of Benjamin, and a Pharisee of the most rigid sect, he was by birth a Roman citizen, a privilege inherited from his ancestors, upon some of whom it had been conferred for services rendered to the state. (Lardner.) The year of his nativity is not known. He was present at the martyrdom of Stephen, A.D. 34, on which occasion he is first introduced to our notice, and is called a young man. He learned the art of tent-making, not with the intention of making it the occupation of his life, but because it was a custom among the Jews to instruct their youth, even of the highest respectability, in some mechanical art. Having been educated in the learning of the times, for which Tarsus was then highly celebrated (Strabo, p. 673. Casaub.), and in which he undoubtedly made great proficiency, he went to Jerusalem to study the laws and traditions of his people under Gamaliel, a distinguished Rabbi. Being a man of great talent, ardent mind, and inflexible resolution, and being devotedly attached to the institutions of his country, whose origin and antiquity alike impressed and fascinated his imagination, he contemplated with alarm and anxiety the progress of the new religion. Accordingly he took an active and prominent part against the Christians, and pursued them with such zeal and unrelenting fury, that his conduct towards them is described as 'breathing out threatenings and slaughter.' He obtained letters from the Sanhedrim to the synagogue of the Jews at Damascus, and also to the governor, authorising him to apprehend and bring to Jerusalem whomsoever of the disciples he might find there. While on his journey for this purpose his miraculous conversion took place, the particulars of which are recorded in the ninth chapter of the 'Acts of the Apostles.' This event, so important in its results upon the subsequent fortunes of Christianity, occurred A.D. 35, two years after the crucifixion of our Lord.

After his baptism at Damascus he went into Arabia. In A.D. 38 we find him again at Damascus; and from that place, as likewise from Jerusalem shortly after, he was compelled to escape secretly and by night, in consequence of the perseverance with which the Jews sought his life, for preaching with so much boldness and success the religion which he once laboured to destroy. From Jerusalem he retired to Tarsus, his native city, and was employed for some years in propagating the faith through the neighbouring regions of Syria and Cilicia. Up to this time the preaching of St. Paul and of the other apostles had been confined to the Jews; but the conversion of Cornelius, a gentile, was a very significant indication that Christianity was intended not for one country or one people, but for all mankind without distinction of race or nation. This was the conclusion inferred both by the apostles and the Jewish converts at Jerusalem. Immediately therefore the object of their mission was extended; and instead of being restricted to the children of Abraham, now comprehended all mankind. Into this great idea, that of founding a religion for the entire human race, St. Paul entered with all the ardour and devotion which characterised his mind. He departed from Tarsus A.D. 42; and in conjunction with Barnabas, who had been sent from Jerusalem for the purpose, preached to the gentiles at Antioch with the greatest success. But the views he had formed of Christianity as a universal religion suggested to him the propriety of enlarging the sphere of his labours, and of carrying the gospel to more remote provinces. To this work he and Barnabas were divinely a-pointed (*Acts*, xiii.); and he commenced his first apostolic journey A.D. 45, ten years after his conversion. In company with Barnabas and Mark the evangelist, he sailed from Seleucia, and successively visited Salamis and Paphos in the Isle of Cyprus; Perga in Pamphylia, and Antioch in Pisidia; Iconium, Lystra, and Derbe, in Lycaonia; and made converts and founded churches in those places. At the end of two years he returned to Antioch in Syria. While at Antioch he was engaged in a most important controversy with some Jewish Christians, who asserted that circumcision was necessary to be observed by converts to the new faith. St. Paul on the other hand, contended that Christianity entirely superseded the Mosaic Law, and required conformity to none of its rites. The question was referred to a council of apostles and elders at Jerusalem, who, after much deliberation, decided in favour of the view which St. Paul had taken. The decision was declared to have received the sanction of the Holy Ghost, and it was communicated to the gentile converts at Antioch and other places.

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[*] This statue replaces one of Louis XIV. erected by the ministers of that prince. The townsmen wished for the statue of Henry IV., but not being able to obtain their wish, took their revenge by inscribing, in the Béarnais dialect, on the pedestal of the statue of Louis, 'This is the grandson of our great Henri.' This statue was destroyed at the Revolution. The castle was much damaged at that period, and subsequently occupied as a barrack and a prison, until the restoration of the Bourbons.

In the year 50, St. Paul commenced his second apostolic journey. Leaving Antioch, and passing through Syria and Cilicia, he traversed the whole extent of Asia Minor, and came to Troas. From Troas, in obedience to the direction of a vision, he sailed over into Europe; and after preaching the gospel at Philippi, Thessalonica, Beræa, and Athens, arrived at Corinth, where he abode a year and a half, and was eminently successful in establishing an important Christian community in that learned, wealthy, and voluptuous city. From Corinth he sailed to Ephesus, and thence to Cæsarea; and taking Jerusalem in his way, returned to Antioch, A.D. 53. During this journey he wrote his two Epistles to the Thessalonians, and his Epistle to the Galatians; the two former, and probably the latter, from Corinth.

Having remained a short time at Antioch, he set out upon his third and last apostolic journey, A.D. 54. He visited the churches in Galatia and Phrygia, and thence came to Ephesus, where he lived about two years. Here and in the neighbouring district of Asia Minor he preached the gospel with so much success, that not only were great numbers converted to Christianity, but those who practised incantations and magical arts and other gross superstitions, for which Ephesus was notorious, renounced their practices, burnt their books and divining instruments, and professed their faith in the new religion. After the disturbance raised by Demetrius the silversmith, of which an account is given in the 19th chapter of the 'Acts,' the Apostle deemed it prudent to leave Ephesus. He went to Troas, and thence passed over into Europe, visiting the churches which he had planted in Macedonia and Greece. From Corinth, where he remained about three months, he returned by Macedonia to Asia; and taking an affectionate farewell of the elders of the Ephesian church at Miletus, embarked for Cæsarea, and terminated his journey at Jerusalem, A.D. 58. On this journey he wrote his first Epistle to the Corinthians, from Ephesus; his first Epistle to Timothy, the one to Titus and the second to the Corinthians, from Macedonia; and his Epistle to the Romans, from Corinth. These journeys occupied him about thirteen years.

While St. Paul was at Jerusalem, some Asiatic Jews, seeing him in the Temple, endeavoured to excite the populace against him by denouncing him as a dangerous and destructive agitator, who was aiming to abolish all distinction between Jew and gentile, teaching things contrary to the Law of Moses, and polluting the holy Temple by introducing the uncircumcised heathen within its precincts. The mob, aroused by this appeal to their passions and their prejudices, would undoubtedly have murdered the Apostle, had he not been rescued by the officer of the Temple guard. The subsequent events—his examination before the Sanhedrim, his defence before Felix and Agrippa, his long confinement at Cæsarea, his appealing to the emperor, and his arrival at Rome, A.D. 61, after a most tempestuous passage, are circumstantially related in the latter chapters of the *Acts*. He remained in Rome, in his own hired house, under the custody of a soldier, for two years; and wrote his Epistles to the Ephesians, Philippians, Colossians, Hebrews, and to Philemon. The Scripture history here leaves him; but it is probable that after his first imprisonment at Rome, which terminated A.D. 63, he visited Judæa, Asia Minor, and Macedonia, and returned to Rome A.D. 65, where he was imprisoned a second time. 'Knowing his departure to be at hand,' he wrote his second Epistle to Timothy; and it is supposed he suffered martyrdom, A.D. 66.

St. Paul was an extraordinary man, and peculiarly fitted for the times in which he lived and the mission to which he was called. He was accomplished in all the learning of the age; was brought up at the feet of one of the most skilful jurists of the East; possessed a powerful intellect, which was cultivated with the greatest care; was strong in feeling, firm in resolution, quick in perception, and sound in the decisions of his judgment. He had too much penetration to be himself easily deceived, and too much honesty to attempt to deceive others. His devoted attachment to the old and time-honoured institutions of his nation, and the zeal and ability he displayed in their defence; his ambition, mental power, and restless activity; and the well-grounded apprehensions with which the preaching of Jesus and his disciples had filled the imaginations of many, and which he alone seemed competent to dissipate, combined to make him an object of general attention to his countrymen, and prepare for him a career of distinction and emolument. His conversion, therefore, which involved the loss of all his brilliant prospects, has, next to the miracles and resurrection of our Lord, been justly contemplated as one of the most striking and memorable events connected with the early history of Christianity. So deeply impressed was Lord Lyttelton with its importance, that he considered it a sufficient demonstration of the divine authority of the religion to which the Apostle was a convert; and with this view he wrote his 'Observations on the Conversion of St. Paul.'

From being a furious zealot, a fierce and unrelenting persecutor of the disciples of Jesus Christ, St. Paul became a disciple himself, and a most energetic advocate of the faith which he had once attempted to destroy. After his conversion St. Paul was indefatigable in preaching the gospel. His perseverance never tired, his courage was never daunted. He was the main instrument of carrying the Christian religion among the Gentiles; and in this mission his labours were continued through a period of many years, and spread over a territory of vast extent. Judæa, Syria, and especially Asia Minor were filled with monuments of his zeal. He also passed over into Europe, where he made converts and planted churches. In this righteous cause he was deterred by no difficulties and no persecutions. He groups together in one passage the dangers which he had encountered: he speaks of toils, stripes, prisons, deaths; of being stoned and shipwrecked; of perils in the city and in the wilderness, on dry land and on the ocean, from false friends and open foes; of watchings and weariness, of hunger and thirst, of cold and nakedness. 'We see him,' says Paley, 'in the prosecution of his purpose, travelling from country to country, enduring every species of hardship, assaulted by the populace, punished by the magistrates, scourged, beat, stoned, left for dead; expecting wherever he came the same treatment; yet, when driven from one city, preaching in the next; unsubdued by anxiety, want, labour, persecution, and the prospect of death.'

The exertions of this great Apostle in the cause of Christianity were not confined to bodily toil and personal instruction. He was the author of fourteen epistles to individuals, and to churches, on various points of Christian doctrine, practice, and discipline. These epistles constitute a very considerable and most important part of the New Testament. They show him to be a man of great genius and great abilities; of clear conception, fervid imagination, lofty intellect, and a large and liberal heart. His style is strong and animated; unlaboured and without artifice in its construction; often broken and abrupt; it abounds in transitions, and brief and rapid allusion to existing errors, practices, and habits of thought, from which he draws the most apt illustrations. He addresses, by turns, the intellect, the imagination, the passions, the heart. He unites a severe logic with the noblest eloquence. The loftiest truths are made subservient to the most sober, pure, and rational morality; a morality essentially practical, and admirably adapted to human character and human circumstances. If he exhorts, it is with intense earnestness; if he reproves, it is in the spirit of sympathy and kindness; and whether he reasons, or advises, or admonishes, or consoles, a manly gravity and seriousness pervade his thoughts. Full of the dignity and grandeur of his subject, his ideas flow from him with irresistible rapidity; and borne along by the sublimity of his theme and the vastness of his conceptions, he stays not to arrange his words and adorn his periods. His arguments carry conviction to the mind of his reader; sometimes disclosing in a few words the profoundest views of Christian truth. His appeals to the passions are equally effective. Hope and fear are important springs of human action; to these he addresses himself, as well as to the reason; not by cold speculation on abstract fitnesses, but by the solemn infallibilities of a resurrection from the dead to an eternity of happiness or misery. With a like mastery and success he interests the affections and the higher moral faculties. Though disclaiming the 'enticing words of man's wisdom,' he could, when the occasion required it, use the arts and display the accomplishments of the rhetorician. His speeches in the *Acts of the Apostles* are worthy of the Roman senate; and his answers, when at the bar, to the questions proposed to him by the court, are distinguished for their address and their dignity. At the same time, wherever he happened to be, whether among the Jews in Pisidia, or the Gentiles at Lystra, or the polished Greeks at Athens, or pleading before Felix and Agrippa, his discources are adapted with admirable judgment and ability to the character and capacities of his several audiences. On the subject of St. Paul's writings, see Dr. Harwood, Michaelis, and Bishop Newton.

There is a tradition in the church that Paul was beheaded near Rome, and buried about two miles from the city, in the Via Ostiensis. A magnificent cathedral dedicated to his memory was built over his grave by Constantine. 'But his noblest monument,' observes Dr. Hales, 'consists in his immortal writings, which, the more they are studied, and the better they are understood, the more they will be admired to the latest posterity for the most sublime and beautiful, the most pathetic and impressive, the most learned and profound specimens of Christian piety, oratory, and philosophy.'

PAUL, ST., CATHEDRAL OF. [London.]

PAUL OF SAMO'SATA was chosen bishop of Antioch in A.D. 260. In consequence of being supposed to hold heterodox opinions concerning the person of Christ, a synod was assembled at Antioch about A.D. 264, to inquire into his sentiments. After holding several meetings, this synod was unable to extract from Paul an avowal of his suspected heresies. In the year 269 another synod was convened on this business, consisting of a large number of bishops, at which Malchion, a rhetorician and presbyter of the church at Antioch, succeeded in convicting Paul of the erroneous opinions imputed to him. He was excommunicated by this synod, which wrote an epistle to Dionysius, bishop of Rome, and to the churches of the empire, giving the reasons for their decision. Fragments of this epistle have been preserved by Eusebius. Though deprived of his bishopric, Paul refused (probably under the protection of Zenobia, who is known to have favoured him) to give up 'the house of the church' till the year 272 or 273, when the bishops who had excommunicated him applied to the emperor Aurelian, who compelled Paul to yield. It is probable that he continued after this to propagate his doctrines. His followers formed a sect under the name of Paulians or Paulianists, which seems to have lasted to the fifth century. They were condemned by the Council of Nice, who ordered those baptised among them to be re-baptised.

The accounts we have of his doctrines are not very clear. The synodical epistle of the council which deposed him speaks less of them than of his personal character, which is represented as marked by pride and arrogance, haughtiness in the exercise of his authority, and great love of pomp and display. He held some secular office together with his bishopric.

The following statement of his opinions by Mosheim appears, as far as we have the means of judging, to be tolerably correct:—'That the Son and the Holy Ghost exist in God, in the same manner as the faculties of reason and activity do in man; that Christ was born a mere man; but that the reason or wisdom of the Father descended into him, and by him wrought miracles upon earth, and instructed the nations; and, finally, that on account of this union of the divine Word with the man Jesus, Christ might, though improperly, be called God.'

(Lardner's *Credibility*, pt. ii., chap. xliii., sect. 8; Mosheim's *Ecclesiastical History*, Cent. iii., pt. ii., chap. v., sect. 15.)

PAUL THE DEACON, or PAULUS DIA'CONUS, called also Warnefridus from his father's name, was born about the year 740, at the town of Friuli (Forum Julii). He same attached to the court of Rachis, king of the Lombards, and afterwards (about 763) he left the court and was ordained deacon of the church at Aquileia. He returned to the court on the invitation of Desiderius, successor of Rachis, by whom he was made chancellor. About the part of his life which followed the overthrow of the kingdom of Desiderius by Charlemagne in 774, we know nothing for certain; but the most probable account is, that he retired to a monastery, and afterwards entered the celebrated monastery of Monte Casino, whence he addressed to Charlemagne, in the year 781, an elegy, in which he implores the release of a brother who had been taken prisoner in the Lombard war. About this time Charlemagne appears to have attached him to his court. He was employed to instruct in Greek the clergymen who were to accompany the emperor's daughter Rotrude in her journey to Constantinople to be married to the son of the empress Irene. Paul visited France, and stayed some time at Metz, of the early bishops of which city he wrote a history. He afterwards returned to Monte Casino, where he died about the year 799.

As a poet Paul is spoken of in the most extravagant terms of praise by his contemporary Peter of Pisa. His poems, which are really good, consist chiefly of hymns and other short pieces in Latin. His fame rests however chiefly on his merits as an historian. His works were,—1, 'Historia Miscella,' a Roman history consisting of twenty-four books, of which the first eleven contain the history of Eutropius; the next five, by Paul himself, contain the period from the reign of Valentinian to that of Justinian; the remaining books are attributed to Landulphus Sagax. The best edition of this work is in Muratori's *Rerum Italicarum Scriptores*. 2, 'De Gestis Longobardarum Libri Sex.' a history of the Lombards; his most valuable work. This also is contained in Muratori's collection. 3, 'Gesta Episcoporum Metensium.' 4, 'Life of St. Gregory the Great.' 5, 'Excerpta' from Festus *De Verborum Significatione*. [Festus.] There are also extant a collection of Homilies and two Sermons which are attributed to him.

(Muratori, *Rerum Ital. Script.*; *Biographie Universelle.*)

PAUL THE SILENTIARY, the son of Cyrus and grandson of Florus, was of a noble family and possessed of great wealth. He held in the palace of Justinian the office of chief of the Silentiarii, a class of persons who had the care of the emperor's palace. When the church of St. Sophia at Constantinople was rebuilt by Justinian (in 562). Paul wrote a description (or ἐκφρασις) of the edifice, in 1026 Greek hexameters, with a procemium consisting of 134 iambic verses. It is evident from this poem that he was a Christian. This work was edited, with notes and a Latin translation, by Du Cange, Paris, 1670. Paul was also the author of a poem entitled εἰς τὰ ἐν Πυθίοις θερμὰ, and of several Epigrams, which are included in the Greek Anthology.

(Fabricii *Bibliotheca Græca*, ed. Harles, vol. iv., p. 457; and vii., p. 581.)

PAUL I. succeeded Stephen III. in the see of Rome A.D. 757. He was involved in disputes with the Longobard king Desiderius, and sought the protection of Pepin, king of the Franks. He died in the year 768.

PAUL II., a Venetian by birth, succeeded Pius II. in 1464. He began by correcting abuses, and checking the exactions of the officers and secretaries of the Papal court, who levied contributions at pleasure from those who had occasion to apply to Rome for licences, rescripts, and other official papers. He endeavoured also to form a league of the Christian princes against the Turks, who threatened Italy, and for this purpose he proclaimed, in 1468, a general peace among the Italian governments, threatening with excommunication those who did not observe it. Paul, in 1471, gave to Borso of Este the investiture of Ferrara with the title of duke as a feudatory of the see of Rome. [Este, House of.] An academy had been formed at Rome for the cultivation of Greek and Roman antiquities and philology, of which Pomponius Lætus, Platina, and other learned men were members. Paul, who, unlike his predecessor Pius II., had no taste for profane learning, became suspicious of the academicians and their meetings. Some one probably excited his suspicions, by accusing them of infidelity and of treasonable designs. The academy was proscribed, some of its members ran away, others were seized and tortured, and among them Platina, who after a year's imprisonment was released through the intercession of several cardinals. It may easily be supposed that Platina, in his 'Lives of the Popes,' which he wrote afterwards under

Sixtus IV., did not spare the memory of Paul II. But besides Platina, other contemporary writers, such as Corio, Ammirato, an anonymous chronicler of Bologna, and the monk Jacopo Filippo of Bergamo, all speak unfavourably of this pope. Paul II. died suddenly in July, 1471, and was succeeded by Sixtus IV. Cardinal Querini has undertaken the defence of Paul II., in his 'Vindiciae adversus Platinam aliosque Obtrectatores.'

PAUL III., Cardinal Alessandro Farnese, succeeded Clement VII., in October, 1534. At that time the most urgent applications were made by the various states of Europe to Rome for the assembling of a general council, which was required by the state of the Western church, distracted by the schism of Luther and Zwingli, as well as by that of Henry VIII. of England. Paul however took a long time to consider before he finally acceded to the request, and it was only in 1542 that he issued the bull of convocation. In the mean time he excommunicated Henry VIII., and released his subjects from their oath of allegiance, by which measure he hastened the total separation of England from Rome. In 1540 he sanctioned the new order of the Jesuits. The war between Francis I. and Charles V. occasioned a further delay in the assembling of the council, which was finally opened at Trent in 1545. That assembly, which was prorogued several times, transferred to Bologna, and afterwards removed again to Trent, did not terminate its sittings till 1563, long after Paul's death.

Paul was very anxious to aggrandize his own family. He had a natural son, Pier Luigi Farnese, whom he first made duke of Castro, and afterwards duke of Parma and Piacenza. For his grandson Ottavio Farnese he obtained the hand of Margaret, a natural daughter of Charles V., and made him duke of Camerino. The pope subdued the people of Perugia, who had revolted against him, put to death several of the leaders, and built a citadel to keep the citizens in awe. He also attacked the Colonna, the most powerful baronial family in the neighbourhood of Rome, took all their strong holds, and obliged the members of that family to take refuge in the fiefs which they held in the kingdom of Naples. He sent a contingent of 12,000 foot and about 1000 horse, under his grandson Duke Ottavio, to join the emperor's army in Germany against the Protestant princes, and he afterwards strongly opposed the religious pacification granted by Charles, in 1547, under the name of the 'Interim.' In the same year Paul received the news of the tragical death of his son Pier Luigi, who was murdered at Piacenza, where he had made himself odious by his tyranny and his lust. Overcome by grief at the news, he told his two grandsons, Ottavio and Cardinal Farnese, who were with him at the time, to take warning from their father's death, and to live in the fear of God. Having secured the succession of Parma and Piacenza to Pier Luigi's son, Paul died, in November, 1549, at a very advanced age, and was succeeded by Julius III.

PAUL IV., Cardinal Gianpietro Caraffa, who was of a noble Neapolitan family, succeeded Marcellus II. in 1555. He was old, haughty, intolerant, and intent upon aggrandizing his nephews. He quarrelled with Philip II. of Spain, who sent the duke of Alba with an army from Naples to invade the papal territory. The duke advanced to the gates of Rome, but after some demonstrations a peace was concluded in 1557. Having learned that his nephews, one of whom he had made a cardinal, were leading a most dissolute life, and were plundering both the people and the treasury of the church, he banished them from Rome in 1559. Paul IV. died shortly after, eighty-four years of age. He had been a zealous advocate of the tribunal of the Inquisition. As soon as the news of his death became known, the people of Rome rose in insurrection, ran to the prison of the Inquisition, wounded a Dominican monk who acted as commissary, delivered all the prisoners, and burnt the papers. They then threw down the statue of the pope, crying out 'Death to the Caraffas.' The tumult lasted several days, after which the conclave elected a new pope by the name of Pius IV., who instituted a process against the nephews of the late pope, two of whom, Cardinal Caraffa and the duke of Paliano, were found guilty of several crimes, and put to death in 1560.

[Botta, *Storia d' Italia*, b. 10; Caracciolo, *Collectanea historica de Vita Pauli IV.*]

PAUL V., Cardinal Camillo Borghese of Rome, succeeded Leo XI. in 1605, when he was fifty-three years of age. His first act was a dispute with the senate of Venice concerning two ecclesiastics, subjects of that state, who, having been accused of heinous crimes, were on their trial before the civil magistrate. The pope asserted that clerical men could only be tried by their bishops, and as the Venetian senate maintained their rights, Paul laid Venice under interdict. The senate forbade the publication of the bull, and as the members of several monastic orders professed that they could not continue to perform religious worship in a country placed under interdict, they were allowed to quit Venice, and the senate appointed secular priests to perform service in their stead. The people remained perfectly quiet, and the bishops and vicars continued their functions as usual. It is reported that the grand-vicar of the bishop of Padua having said to the podestà, or civil governor of that city, that he ought to act conformably to the inspiration of the Holy Ghost, the podestà replied to him that he understood that the Holy Ghost had already inspired the Council of Ten with the resolution of hanging all those who would not obey the orders of the senate. (Botta, b. 15.) Paolo Sarpi, the senator Antonio Querini, and others, wrote in defence of the senate, and Cardinal Baronius and Bellarmine wrote in defence of Rome. There were three points at issue between the pope and the senate: 1, the senate had made a decree that no new convent or religious congregation should be founded without their permission; 2, that no property or perpetual revenue of any kind should be bequeathed to the church without their approbation; 3, that clerical men accused of crimes should be judged by the secular power like other citizens. The king of France and the emperor took the part of Venice, the court of Spain that of the Pope, and Italy was threatened with a war like that of the Investitures. Henri IV. of France however proposed his mediation, and sent to Venice Cardinal de Joyeuse, who, after consulting with the senate, proceeded to Rome, where he succeeded in effecting a compromise. The decrees of the senate were maintained, but the two clerical culprits, in compliance with the wish of the French king, were given up to the pope, 'saving the right of the republic to punish all offenders, clerical or lay, within its dominions.' Upon this arrangement being made, the interdict was removed.

In 1614 Pope Paul had a dispute with Louis XIII., on account of a book of the Jesuit Suarez, entitled 'Defensio Fidei,' in which the author maintained that in certain cases it was lawful to murder kings. This book was publicly burned by sentence of the parliament of Paris. The pope maintained that he was the proper authority to decide upon the contents of works concerning religious and moral doctrines, and that the book ought to have been referred to him. This affair was likewise settled by a compromise.

The pope was in the meantime usefully employed in reforming many abuses in the tribunals and other offices of the Roman court, and in embellishing the city of Rome. In this respect he ranks among the most distinguished pontiffs for his encouragement of the fine arts. He enlarged the Vatican and Quirinal palaces, restored the church of Santa Maria Maggiore, constructed or repaired aqueducts, made additions to the Vatican library, collected statues and other antiquities, and built the handsome villa Mondragone at Frascati. He established the fortune of the Borghese family, which is one of the wealthiest of the Roman families. Paul V. died in 1621, and was succeeded by Gregory XV.

PAUL I., emperor of Russia, son of Peter III. and Catherine II., was born in 1754. He lost his father at an early age, and the death of his brother Ivan, in 1763, made him heir apparent to the crown. He had good instructors, but was treated with great strictness by his mother as long as she lived, and was studiously kept in ignorance of all public affairs. She often expressed an unfavourable opinion of his judgment and disposition, and it is believed that she would have disinherited him had she been able to do it. In 1776 Paul married Mary of Würtemberg, an amiable princess, by whom he had four sons, Alexander, Constantine, Nicholas, and Michael, and several daughters. In 1780 he travelled with his wife through Germany, France, and Italy, under the title of 'Comte du Nord.' On his return to Russia he continued to live in retirement, at the country residence of Gatschina, thirty miles from Petersburg, and his sons and daughters were educated at court, under the eye of the empress. In 1796, on the death of Catherine, Paul, then 42 years of age, emerged from his restraint, and was proclaimed emperor. He began by causing solemn funeral honours to be paid to his father, together with the late empress, and for this purpose he had the coffin containing his body removed from the place where it had been deposited, and placed in the church by the side of the corpse of Catherine. Paul also went in person to release the Polish patriot Kosciuzko, who was confined as a state prisoner, not however in a dungeon, as some have said, but in a private house, under a military guard, and he gave him money to enable him to go and live in the United States. He likewise liberated Pototsky and the other unfortunate Poles who were confined at Schlusselburg and other fortresses. These acts of the new emperor gave hopes of a good reign, but Paul's character soon showed itself in all its capriciousness and violence. He liked to interfere in the most minute details of police and of military discipline; he forbade the wearing of round hats in the streets of Petersburg; he likewise proscribed trowsers and frock coats, and several foreigners were ill-used in consequence of these absurd regulations. Any one who met him in the street was obliged to take off his hat, even in the severest weather, and ladies were required to alight from their carriages. For the former convenient dress of the Russian infantry, consisting of a jacket and pantaloons, he substituted the German uniform, with tailed coats, spatterdashes, and queues bedaubed with grease and flour as being cheaper than powder and pomatum. This caused much discontent among the soldiers and numerous desertions, a thing almost unknown till then in the Russian army. In the same spirit, Paul, whose only wish was to alter rather than to improve, remodelled all the departments of administration, and all the courts of the empire, in consequence of which thousands of civil officers were thrown out of employment.

In his foreign politics Paul at first seemed disposed to adopt a system of neutrality in the great quarrel between France and the allied powers. But he soon became alarmed at the progress of the French arms, and at the encroachments of the French directory; the invasion of Switzerland, of Rome, Naples, Malta, and Egypt, determined him for war. He had an army of from 40,000 to 50,000 men assembled in Gallicia by Catherine, and he ordered it to join the Austrians and march upon Italy. The veteran Suwarrow, the most distinguished general of Russia, who had been dismissed by Paul soon after his accession, for having sneered at his martinet innovations in the army, was appointed to command the expedition. For an account of his successful campaign in Italy, in 1799, see SUWARROW. Another Russian army, 40,000 strong, under General Korsakow, was sent to join the Archduke Charles in Switzerland. This army was defeated by Massena, at Zürich, in September, 1799. A third army was sent to join the English, under the Duke of York, in Holland, and that expedition also failed. A fourth Russian army was embarked in a fleet, which, joined to the Turkish fleet, conquered the Ionian Islands, and assisted in restoring the king of Naples to his continental dominions. In the end however, Paul was sorely disappointed in his military expectations. His best general, Suwarrow, after the conquest of Italy, having marched into Switzerland to join his comrades there, arrived just after the defeat of Korsakow, and was obliged to retreat through the Alps of Glaris into the Grisons country. He and his army were recalled by the emperor, and Suwarrow arrived, desponding and in bad health, at Petersburg, where he soon after died. Paul, who had broken the heart of the veteran by attributing to him the disasters in Switzerland, in which he had had no part, relented towards him in his last moments, sent to inquire how he did, and allowed the grand-dukes, his sons, to go and visit him. Paul withdrew from the coalition without publishing his reason for it; he offended the allies, but at the same time made no proposals of peace to France. He thus displeased everybody, and showed himself fickle, passionate, and weak. His private conduct partook of the same character. He became more stern and morose, showed suspicion of everybody, and was disliked by all. The soldiers detested him for his vexatious minuteness in discipline, the nobility for his rude and often cruel behaviour, and men of information for his proscription of books and journals. Paul chose to quarrel with England because she would not give up Malta. He had caused himself to be elected grand-master of the order of St. John, after the death of the grand-master Hompesch, and he expected England to give up the island to him. After the battle of Marengo, Bonaparte bethought himself of profiting by this disposition of Paul, in order to gain his friendship. He accordingly collected all the Russian prisoners in France, clothed them, supplied them with muskets, and sent them back to Russia. This produced its effect, and Paul, who had proclaimed himself the champion of legitimacy, became all on a sudden a great admirer of Bonaparte.

His next step was to seize the English vessels and other property in his harbours, because England had sent a fleet to Copenhagen in August, 1800, to oblige Denmark to acknowledge the navigation laws and the right of search of neutral vessels. In December of the same year, Paul concluded a convention with Sweden and Denmark, to which Prussia soon after acceded, by which the right of search of neutral vessels was declared an attempt against the sovereign rights of the nation to which they belonged, and a squadron of the four Baltic powers was to be assembled to protect their merchant vessels, and resist any attempt at searching them. In consequence of this step England put an embargo upon the vessels of the Baltic powers. Paul now sent an agent to Bonaparte, and friendly communications were re-established between France and Russia. Bonaparte even accepted Paul's mediation in favour of the court of Naples, which was still at war with France. Count Kalitscheff came to Paris as ambassador of Russia, and was received with great distinction. 'France,' said Bonaparte publicly, 'can ally itself only with Russia, for Russia is mistress of the Baltic and Black seas, and she holds the keys of India in her hands, and the emperor of such a country is truly a great prince. Paul is eccentric, but he has at least a will of his own.' (Thibaudeau, *Le Consulat et l'Empire*, ch. xiv.)

After peace was concluded at Luneville between France and Austria, in February, 1801, Bonaparte secretly concerted with the court of Russia the plan of an expedition to India. Thirty thousand chosen French troops were to march into Poland, and there join an equal number of Russian infantry, besides 40,000 Cossacks and other irregular cavalry, and thence the allied army was to proceed to the borders of the Caspian Sea, either to embark and cross that sea or march by the way of Persia, whose consent was solicited by the two powers. (Thibaudeau, ch. xv.) Meantime England had sent a fleet into the Baltic, under admirals Parker and Nelson, to dissolve the maritime coalition. On the 2nd of April, Nelson attacked the Danish fleet, and on the 4th an armistice was signed between Denmark and England. While the armistice was being concluded, news arrived of the sudden death of Paul, which happened in the night of the 24th of March. The Baltic coalition was thereby dissolved. A conspiracy had been formed among the officers near the person of the emperor, who went in a body at night to his apartments, and presented him an act of abdication to sign, on the score of mental weakness. Paul refused, saying 'he was emperor, and would remain emperor.' A scuffle ensued, in which the unfortunate monarch was overpowered and strangled. His son Alexander was proclaimed emperor.

When the news arrived at Paris, Bonaparte was greatly vexed and mortified. Talleyrand, to calm him, observed that 'this was the customary mode of abdication in Russia.' According to the practice of those times, the French papers intimated that England was privy to the conspiracy; but the fact is that the Russians had become weary of Paul's caprices, which bordered upon insanity, and the plan of forcing him to abdicate, though not of murdering him, appears for some time previous to have been discussed among the members of the court, and even of the Imperial family, as a measure of absolute necessity. At the news of his death, the whole city of Petersburg, the army, nobles, and people rejoiced.

PAUL, FATHER, the celebrated historian of the Council of Trent, whose original name, before he embraced the monastic profession, was Pietro Sarpi, was born at Venice, in the year 1552, of a respectable commercial family. His father however was unsuccessful in trade; and his mother, a woman of sense and virtue, was early left a widow in indigent circumstances. Fortunately her brother was the master of an excellent school, and under his care she placed her son, who from infancy displayed an extraordinary aptitude for study. Before the completion of his fourteenth year, he had made great progress in mathematics and logic, as well as in general literature; and at that boyish age, having become a pupil of the logician Capella of Cremona, ho was of the Servite order, this connexion led him, con- rary to the urgent advice of his uncle and mother, to adopt he same monastic habit and rule with his preceptor. In is twentieth year he solemnly took the vows of the order.

At the same period, the ability which he displayed in a ublic disputation, held at Mantua, during a chapter of his rder, attracted the favourable notice of the reigning prince f the house of Gonzaga, and he was appointed to the pro- essorship of divinity in the cathedral of that city. But ough he was honoured with many marks of regard by the antuan duke, a public life was little to his taste; and he oon resigned his office and returned to the learned se- lusion which he loved. In that retirement he continued to ultivate learning and science; and in his twenty-second ear, he had not only already mastered the Latin, Greek, ebrew, and Chaldee languages, but was also a proficient n the civil and the canon law, in various departments of hilosophy, in mathematics and astronomy, in chemistry, edicine, and anatomy. In these last sciences he became eeply versed for his times, and it has been alleged that he as acquainted with the circulation of the blood.

The claim of Sarpi to be considered the discoverer of the rculation rests on the authority of Veslingius, who states, his 'Epist. Anat. et Medicæ,' ep. xxvi., that he had read manuscript by Sarpi, belonging to his pupil and successor ulgentius, in which the circulation was described. George nt (Harvey's commentator and friend) admitted the tes- mony, but said that whatever Sarpi knew of the circula- on, he learned from Harvey himself. Riolanus, Harvey's our adversary, gives no credit for the discovery to Sarpi; nd Fulgentius himself does not claim it for him.

Several writers attribute to Sarpi the discovery of the alves of the veins, which gave Harvey the first idea of a rculation; but Fabricius was acquainted with them in 574, when Sarpi was but 22 years old, and it is certain at he (Fabricius) taught Harvey their existence.

The above is on the authority of Haller (*Bibliotheca Ana- omica*), who does not attribute any part of the discovery to arpi.

The pursuit of such studies, and the renown which they ocured for him, no less than the freedom of his expressed inions in correspondence with the kindred minds of his e, drew upon him the envy and suspicion of the mean and gorant; and he was twice arraigned before the Inquisition a false and absurd accusation of heresy, and on a better- unded charge of having declared in a letter his detestation the papal court and its corruptions. His high reputation aved him in both cases; but the court of Rome never rgave him, and, at a subsequent period, revenged and jus- fied his bad opinion of its administration by refusing to ward his unquestionable merits with preferment to a bi- opric. The famous dispute which arose between the Ro- an see and the republic of Venice, during the pontificate Paul V., in the year 1606, drew the speculative recluse om the quietude which had only been thus partially in- rrupted, into open and dangerous collision with the papal wer. When Paul V. endeavoured to revive the doctrines the supremacy of the popedom over all temporal princes d governments, and reduced these pretensions to practice laying the Venetian state under an interdict and excom- unication for having subjected priests to secular jurisdic- on, the senate of Venice, not contented with setting these ritual weapons at defiance, determined to support by argu- ent the justice of their cause. The most eloquent and ccessful advocate whom they employed for this purpose s Father Paul; and animated both by zeal in the service his native state and by indignant opposition to the omish usurpations, he fulfilled his task with equal courage d ability. Though several cardinals and Jesuits strenuously gaged in the controversy on the papal side, the fallacy of e pretensions which they attempted to uphold was so sig- lly exposed by Sarpi and others, that the pope, finding his apons contemned, his efforts unsupported by his political ies, and his sentence rendered nugatory by the firmness the Venetian senate, was finally compelled to consent to accommodation very honourable to their state.

The papal party however, though reduced to yield to the ower of that republic and the strength of her cause, was olved not to forego its vengeance against her defenders, nd among them Father Paul was signally marked for a ctim. Several attempts were made to assassinate him; notwithstanding the apparent security of his retreat at Venice, was attacked one night as he was returning home to his monastery by a band of ruffians, who inflicted on him no fewer than twenty-three wounds. The assassins escaped in a ten-oared boat; and the papal nuncio and the Jesuits were naturally suspected of being the authors of a plot prepared with such a command of means and expensive precautions. None of the wounds of Father Paul were mortal; and preserving one of the stilettos which the assassins had left in his body, he surmounted it with the appropriate inscription, 'Stilo della chiesa Romana' ('Pen (or dagger) of the Romish church').

These attempts upon his life compelled Father Paul to confine himself to his monastery, and induced him to employ his constrained leisure by engaging in the great literary composition by which he is chiefly remembered, 'The History of the Council of Trent;' a work which has been not more deservedly commended for its style as a model of historical composition, than for the extent of its learning, the generous candour of its spirit, the unbiassed integrity of its principles, and the unostentatious piety of its sentiments. While occupied in this and other labours of minor import, Father Paul was overtaken by death, in his seventieth year. A neglected cold produced a fever, the immediate cause of his dissolution; and after lying for nearly twelve months on a bed of sickness, which was supported with the usual edifying cheerfulness and piety, he expired in the beginning of the year 1623, and his memory was honoured by the gratitude of the Venetian republic with a public funeral.

The discussion of Father Paul's theological opinions and conduct is beyond our province. His opposition to the papal see has drawn upon his character the severe animadversions of Roman Catholic divines, and procured for it in a consequent degree the favour of Protestant writers. It may here suffice to observe that the uprightness of his motives and the sincerity of his religious faith have never fairly been impugned; while his leaning to the doctrines of the Protestant churches has been variously inferred as a matter either of commendation or reproach. The reader will find various notices on this subject scattered through the Dictionary of Bayle; though it is to be regretted that Bayle, after promising in the early part of his work to devote an article expressly to the personal and literary history of Sarpi, was prevented by his limits from fulfilling a design so congenial to his tastes. A Life of Father Paul however was published in England in 1651, and also at Leyden in 1661; and an able and accurate sketch of his fortunes and character is to be found in our language among the collected works of Dr. Samuel Johnson. Editions of Father Paul's 'History of the Council of Trent' were published in London, in Italian, English, and French, in 1619, 1676, and 1736; and of his whole works, in the original language, at Verona and Naples, in 1761-68, and 1790.

PAUL VERONE'SE. [CAGLIARI.]

PAULICIANS. [MANICHEANS.]

PAULI'NUS, SAINT PO'NTIUS MERO'PIUS, bishop of Nola, was born about A.D. 353, at Bordeaux, of a noble family. He was a pupil of Ausonius, and was recommended by him to the emperor Gratian, who appointed him consul in 378, and afterwards advanced him to several offices of great importance. Through the influence and exhortations of St. Ambrose, he was induced to relinquish the world and give his property to the church. He was ordained presbyter in 393, was made bishop of Nola in 409, and died in 431.

Paulinus wrote several works, of which only a few have come down to us; the principal of which are a discourse on alms-giving, some letters, and a few poems on religious subjects. Paulinus was intimate with the most distinguished theologians of his time, and is frequently mentioned in the Epistles of St. Augustin and St. Jerome. His works were published for the first time by Badius, Paris, 1516; but the best editions are by Muratori, Verona, 1736, fol.; and the one printed at Paris in 1685, 2 vols. 4to.

PAULI'NUS, SAINT, patriarch of Aquileia, is chiefly known in ecclesiastical history for the exertions he made in defence of the Trinity. He was born near Friuli, about 730, and was made patriarch of Aquileia by Charlemagne in 776. He died in 804. His works have been published by Madrisi, Venice, 1737.

PAULINUS, better known under the name of **JOHN PHILIP WERDIN,** was born near Mannersdorf in Austria, on the 25th of April, 1748. He studied philosophy and theology at Prague, and afterwards learned some of the oriental languages in the college of the Carmelites at Rome, which order he had joined in 1769. He was sent to the coast of Malabar in 1774, where he remained for 14 years, and was successively appointed vicar-general and apostolic visitor. In 1790 he returned to Rome in order to superintend the religious works which were printed by the Propaganda for the use of the missionaries in Hindustan. He died at Rome, on the 7th of January, 1806.

Paulinus was one of the earliest Europeans who acquired a knowledge of the Sanscrit language. In consequence of his being settled in the south of Hindustan, he was not placed in such favourable circumstances as our countrymen in Bengal for obtaining an accurate knowledge of Sanscrit, since the Brahmans of the north are much more skilled in that language than those of the south. Paulinus however was very unwilling to admit his inferiority to the English scholars, and he frequently attacked them in his works. The Sanscrit Grammar of Paulinus is published in the Tamul character instead of the Devanagari, which is the character in which all Sanscrit works are written in the north of Hindustan, and which is employed in the Sanscrit grammars and works which have been published at Calcutta and in Europe.

The Sanscrit Grammar of Paulinus was published at Rome, in 1790, under the title of 'Sidharubam, seu Grammatica Samscrdamica, cum Dissertatione historico-critica in Linguam Samscrdamicam,' and also in a fuller and different form in 1804, under the title of 'Vyacarana, seu locupletissima Samscrdamicæ Linguæ Institutio;' but both these works are entirely superseded by the more accurate and complete grammars of Wilkins and Bopp. Paulinus also wrote and edited many other works, of which the most important are:—'Systema Brahmanicum liturgicum, mythologicum, civile, ex monumentis Indicis, &c., dissertationibus historicis illustravit,' Rom., 1791; 'India Orientalis Christiana, continens Fundationes Ecclesiarum, Seriem Episcoporum, Missiones, Schismata, Persecutiones, Viros illustres,' Rom., 1794; 'Viaggio alle Indie Orientali,' Rom., 1796; 'Amarashinha, seu Dictionarii Samscrdamici sectio prima, de Cœlo; ex tribus ineditis Codicibus Indicis Manuscriptis, cum Versione Latina,' Rom., 1798 (the whole of this dictionary, of which Paulinus has edited the first part, was printed at Serampore, in 1808, under the care of Colebrooke); 'De Antiquitate et Affinitate Linguæ Zendicæ et Samscrdamicæ germanicæ Dissertatio,' Rom., 1798, Padua, 1799; and 'De Latini Sermonis Origine et cum Orientalibus Linguis Connexione,' Rom., 1802.

PAULINUS SUETO'NIUS. [BOADICEA; BRITANNIA.]

PAULO, S. [PAOLO, S.]

PAULUS ÆGINE'TA (Παῦλος Αἰγινήτης), so called from his birthplace, the island of Ægina, in the Sinus Saronicus, is one of the latest and at the same time one of the most valuable of the antient Greek medical writers whose works are still extant. Abulfaraj (*Hist. Dynast.*, p. 114, ed. Pococke) states that he lived in the seventh century A.D., which is probably somewhere near the truth, as he quotes Alexander Trallianus (lib. iii., cap. 28; vii. 5, 11, 19), who is supposed to have lived about the middle of the sixth. Nothing is known of the events of his life, except that he travelled a great deal, as we learn from the two following barbarous Greek iambics prefixed to his work:—

Παύλου πόνον με γνῶθι τοῦ γῆς τὸ πλέον
διαδραμόντος, φύντος ἐκ γῆς Αἰγίνης.

It is on this account (as some think) that he is sometimes called *περιοδευτής*, but according to others, the epithet signifies 'qui obeundis ægrotorum decumbentium ædibus medicinam facit.' He appears to have visited Alexandria (lib. vii., cap. 17; and iv. 49); and it is probable that he there obtained the title *ἰατροσοφιστής*, which is sometimes given him. Suidas says he wrote various medical works (*ἰατρικὰ βιβλία διάφορα*); and Abulfaraj, that he composed a treatise on medicine, in nine books, and one on female diseases. The latter work (if some parts of the first, third, and sixth books, which treat of that subject, are not meant) is lost; the former still remains, with the title *ἐπιτομῆς ἰατρικῆς βιβλία ἑπτά*, 'Compendii Medici Libri Septem.' As there is no reason for supposing this work to be imperfect, it is probable that each of the third and seventh books, which are much longer than the rest, was divided by the Arabic translator into two. He appears to have been much esteemed by the Arabians, who, on account of his skill in midwifery and female diseases, called him *Al-Kawabeli*, 'the accoucheur.' His remaining work is chiefly a compilation from Galen, Oribasius, Aëtius, and others; and indeed he tells us himself in the preface, that he meant it to supersede the short abridgment, by Oribasius, of his own larger work, the 'Hebdomecontabiblon;' however it contains also a good deal of original matter, though the author speaks very modestly of his own additions. The following account of the contents of each book is given by himself in his preface, and the English translation by Mr. Adams has been adopted. 'In the first book you will find everything that relates to Hygiene, and to the preservation from and correction of distempers peculiar to the various ages, seasons, temperaments, and so forth; also the powers and uses of the different articles of food, as we have explained in a summary manner. In the second is explained the whole doctrine of fevers, an account of certain matters relating to them being premised, such as excrementitious discharges, critical days, and other appearances, and concluding with certain symptoms, which are sometimes the consequences of fever. The third book relates to topical affections, beginning from the crown of the head, and descending down to the nails of the feet. The fourth book treats of those complaints which are external and exposed to view, and are not limited to one part of the body: also of intestinal worms and dracunculi. The fifth treats of the wounds and bites of venomous animals; also of the distemper called hydrophobia, and of persons bitten by dogs which are mad, and by those which are not mad; and also of persons bitten by men: among other things it treats of deleterious substances and the preservatives from them. In the sixth is contained everything relating to surgery, both what relates to the fleshy parts, such as the extraction of weapons; and to the bones, which comprehends fractures and dislocations. In the seventh is contained a description of the properties of all medicines, first of the simple, then of the compound; particularly of those which I have mentioned in the preceding six books, and more especially the greater, and, as it were, celebrated preparations. Towards the end are certain things connected with the composition of medicines, and of those articles which may be substituted for one another; the whole concluding with an account of weights and measures.'

The most valuable and original part of his work is the sixth book, which contains several descriptions of operations, either first mentioned there, or else with more accurate and precise directions than in any former author. There is a minute and excellent account of bronchotomy, taken from Antyllus (vi. 33). He recommends the jugular veins to be opened (vi. 40), and also in some cases the division of an artery (*ibid.*). He describes minutely and accurately the different kinds of hernia, and the operation necessary for replacing the intestine (vi. 65). He notices that few persons, if any, recover if hydrophobia comes on after the bite of a mad dog; but that if the wounded part be immediately cut out, there is but little danger (v. 3). He gives directions for opening an imperforate hymen (vi. 72) and anus (vi. 81). The work is also valuable as containing fragments of many authors whose writings are lost, such as Antyllus, Archigenes, and Diocles Carystius; the letter sent by the last writer to king Antigonus, entitled προφυλακτική, 'Ad Valetudinem Tuendam,' is inserted at the end of the first book.

The Greek text was first published, Venet., 1528, fol., in ædib. Aldi et Andr. Asulani; the second and last edition, which is much superior to the former, was published Basil., 1538, fol., ap. Andr. Cratandrum, under the care of Hier. Gemusæus. There are three Latin translations of the whole work, besides several others of detached parts —1, That by Albanus Torinus, Basil., 1532, fol., and several times reprinted, together with the sixth book, which was omitted in the first edition; 2, That by Jo. Guinterius Andernacus, Paris, 1532, fol., much superior to the former, and several times reprinted; and 3, That by Ja. Cornarius, Basil., 1556, fol., accompanied by a valuable commentary, or (as he expresses it) '*dolabellarum*, sive castigationum in libris septem *dedolata* ac lævigata.' This translation and commentary are inserted in the 'Medicæ Artis Principes,' Paris, 1567, fol., ap. Henr. Steph. An Arabic translation was made by the celebrated Honain Ibn Ishak, better known perhaps by his Latinised name *Joannitius* (*Hist. Philosoph.*, apud Casiri, *Biblioth. Arabico-Hisp. Escur.* tom. i., p. 288), which, according to Haller (*Biblioth. Chirurg.*), still exists somewhere in MS. There is an

English translation with a copious and learned commentary, by Francis Adams, of which unhappily only the first volume is published, Lond., 1824, 8vo.

PAULUS, JULIUS, one of the most distinguished of the Roman lawyers, was the contemporary of Ulpian, and may be most conveniently referred to the time of the emperor Alexander Severus. The place of his birth is unknown. The reasons alleged for supposing him to be a native of Syria, namely, his intimacy with Ulpian, who was a native of Tyre, and with Mammaea, the mother of Alexander Severus, who was a native of Emesa, are manifestly no proofs at all. In addition to this, there is the negative evidence derivable from his own silence on an occasion when he might have said that he was a native of Syria, if such was the fact (*Dig.*, 50, tit. 15, s. 1, 10). It has also been supposed that he was a native of Padua, an opinion founded on the fact of there being at Padua a statue which bears the name of Paulus; and the inscription is obviously comparatively recent. But the statue and inscription may refer to another person. The Græcisms supposed to characterise his style, and his familiarity with the Greek language, have been adduced as arguments confirmatory of his alleged foreign origin.

Paulus was also a contemporary of Papinian [PAPINIAN], and apparently rather his rival, than his pupil, as some writers have supposed. He was made præfectus prætorio by Alexander Severus, or, according to others, by his predecessor, Elagabalus. He was banished by Elagabalus, but recalled by Alexander Severus (Aurel. Vict., c. 24); unless Victor has confounded Paulus with Ulpian. (Lamprid., *Alex.*, c. 26.)

Paulus was perhaps the most voluminous of all the Roman writers on law, and the extracts from his works contained in the 'Digest' are more numerous than those from any other writer except Ulpian. According to Haubold, the 'Digest' contains 2462 extracts from Ulpian, and 2083 from Paulus. The proportion which each body of extracts bears to the whole compilation is shown in the article JUSTINIAN'S LEGISLATION.

Paulus wrote under the emperor Antoninus Caracalla and his successors to the time of Alexander Severus. His style, so far as we can judge from the extracts in the 'Digest,' is concise, and sometimes obscure, owing to his leaving the reader to supply some of the steps in his argument. Like the rest of the great Roman jurists, he was subtle in thought and clear and comprehensive in his judgments. He has been accused of violent hatred of the Christians, but the accusation is not supported by proof.

The following are the titles of a few of the works of Paulus: 80 books on the 'Edict,' 26 books of 'Quæstiones,' 23 books of 'Responsa,' 23 books of 'Brevia,' 5 books of 'Sententiæ,' dedicated to his son, 3 books on 'Adultery,' &c. A complete list of the works of this laborious jurist is given by Zimmern (*Geschichte des Römischen Privatrechts*, &c.). Of all these works there only remain the excerpts in the 'Digest,' and the 5 books of the 'Receptæ Sententiæ,' which are preserved in an imperfect shape in the compilation made by the order of Alaric II., commonly called the 'Breviarium Alaricianum.'

A very full account of Paulus and his writings, by Ber-[illegible], is contained in the *Jurisprudentia Vetus Ante-Justinianea* of Schulting.

PAULUS ÆMILIUS. [ÆMILII.]

PAUMBEN. [HINDUSTAN, vol. xii., p. 205.]

PAUN-AIR. [HINDUSTAN, p. 208.]

PAUPERISM AND POOR LAWS. The term pauper, according to the most convenient use of the word, is a person receiving legal relief. It thus comprehends those who being without capital, but able and willing to labour, are unable to find permanent employment at rates of wages sufficient for their subsistence, and are wholly or partly supported by public funds. The term also comprehends orphan, bastard, and deserted children who require and receive legal relief; as well as those who, from age, sickness, or infirmity, are disabled from labour, have no means of support, and receive legal relief.

It must be evident from this definition that in every country those who are properly called paupers are only one class or division among several who are in the condition of poverty. The poor of a country, as distinguished from the paupers, may be distributed into three classes: 1. Persons without capital, who, being capable of labour, and finding employment, are able to obtain the means of subsistence. 2. Able-bodied mendicants, capable of labouring, who dislike work, and subsist by practising deceptions upon the humane and charitable. 3. Persons destitute through sickness, infirmity, desertion, or any other cause, and relieved by private charity.

The causes of pauperism are numerous, and it would be equivalent to an attempt to explain most of the phenomena of modern society, if we should affect to assign all its possible or even all its actual causes in any given country. Some of the causes however are clearly traceable to positive law. Every civilized community has necessarily a great body of laws which concern the rights of property, and which regulate to some extent the conduct of the individual members of a community. It is difficult even for a wise legislator to attempt to regulate a large community without doing some mischief by his interference; and the history of positive legislation in this and other countries shows that those who have had the power to make laws have not only ignorantly and unintentionally injured society by not perceiving the tendency of their own enactments, but have often purposely and designedly attempted to accomplish objects which they believed to be beneficial to society, but which an enlarged experience and a sound philosophy have proved to be detrimental to the general interest. When the object has been a good one, a legislator has often failed in accomplishing it, owing to ignorance of the proper means. In England legal interference with the condition of the poor has in some degree been exercised for nearly 500 years. In no country have greater efforts been made to regulate their condition, nor greater mistakes committed in this branch of government.

The great object of the earlier efforts in pauper legislation was the restraint of vagrancy. The 12th Richard II., c. 7 (1388), prohibits any labourer from quitting his dwelling-place without a testimonial from a justice of the peace, showing reasonable cause for his going, and without such a testimonial any such wanderer might be apprehended and put in the stocks. Impotent persons were to remain in the towns where they were dwelling at the passing of the act, provided the inhabitants would support them; otherwise they were to go to the places of their birth, to be there supported. By acts passed in the 11 and 19 of Henry VII. (1495 and 1504) impotent beggars were required to go to the hundred where they had last dwelt for three years, or where they were born, and were forbidden to beg elsewhere. By the act 22 Henry VIII., c. 12 (1531), justices were directed to assign to impotent poor persons a district within which they might beg, and beyond which they were forbidden to beg, under pain of being imprisoned and kept in the stocks on bread and water. Able-bodied beggars were to be whipped and forced to return to their place of birth, or where they had last lived for three years.

These acts appear to have had no permanent effect in repressing vagrancy. An act passed in 1536 (27 Henry VIII., c. 25) is the first by which voluntary charity was converted into compulsory payment. It enacts that the head officers of every parish to which the impotent or able-bodied poor may resort under the provisions of the act of 1531, shall receive and keep them, so that none shall be compelled to beg openly. The able-bodied were to be kept to constant labour, and every parish making default was to forfeit twenty shillings a month. The money required for the support of the poor was to be collected partly by the head officers of corporate towns and the churchwardens of parishes, and partly was to be derived from collections in the churches and on various occasions where the clergy had opportunities for exhorting the people to charity. Almsgiving beyond the town or parish was prohibited, on forfeiture of ten times the amount given. A 'sturdy beggar' was to be whipped the first time he was detected in begging; to have his right ear cropped for the second offence; and if again guilty of begging, was to be indicted 'for wandering, loitering, and idleness,' and if convicted was 'to suffer execution of death as a felon and an enemy of the commonwealth.' The severity of this act prevented its execution, and it was repealed by 1 Edward VI., c. 3 (1547). Under this statute every able-bodied person who should not apply himself to some honest labour, or offer to serve for even meat and drink, was to be taken for a vagabond, branded on the shoulder, and adjudged a slave for two years to any one who should demand him, to be fed on bread and water and refuse meat, and made to work by being beaten, chained, or otherwise treated. If he ran away during the two years, he was to be branded on the cheek, and adjudged a slave for life, and if he ran away again, he was to suffer death as a felon. If not demanded as a slave, he was to be kept to hard labour on the highways in chains. The impotent poor were to be passed to their place of birth or settlement, from the hands of one parish constable to those of another. This statute was repealed three years after, and that of 1531 was revived. In 1551 an act was passed directing that a book should be kept in every parish, containing the names of the householders and of the impotent poor; that collectors of alms should be appointed who should 'gently ask every man and woman what they of their charity will give weekly to the relief of the poor.' If any one able to give should refuse or discourage others from giving, the ministers and churchwardens were to exhort him, and, failing of success, the bishop was to admonish him on the subject. This act, and another made to enforce it, which was passed in 1555, were wholly ineffectual, and in 1563 it was re-enacted (5 Eliz., c. 3), with the addition that any person able to contribute and refusing should be cited by the bishop to appear at the next sessions before the justices, where, if he would not be persuaded to give, the justices were to tax him according to their discretion, and on his refusal he was to be committed to gaol until the sum taxed should be paid, with all arrears.

The next statute on the subject, which was passed in 1572 (14 Eliz., c. 5), shows how ineffectual the former statutes had been. It enacted that all rogues, vagabonds, and sturdy beggars, including in this description 'all persons whole and mighty in body, able to labour, not having land or master, nor using any lawful merchandise, craft, or mystery, and all common labourers, able in body, loitering and refusing to work for such reasonable wage as is commonly given,' should 'for the first offence be grievously whipped, and burned through the gristle of the right ear with a hot iron of the compass of an inch about;' for the second, should be deemed felons; and for the third, should suffer death as felons, without benefit of clergy. For the relief and sustentation of the aged and impotent poor, the justices of the peace within their several districts, were 'by their good discretion' to tax and assess all the inhabitants dwelling therein. Any one refusing to contribute was to be imprisoned until he should comply with the assessment. By the statutes 39 of Elizabeth, c. 3 and 4 (1598), every able-bodied person refusing to work for the ordinary wages was to be 'openly whipped until his body be bloody, and forthwith sent, from parish to parish, the most strait way to the parish where he was born, there to put himself to labour as a true subject ought to do.'

The next act on this subject, the 43 Elizabeth, c. 2, has been in operation from the time of its enactment, in 1601, to the present day. An entire change in the mode of administration which had grown up under its provisions, was however effected by the Poor Law Amendment Act (4 and 5 Wm. IV., c. 76), which was passed in 1839. During that long period many abuses crept into the administration of the laws relating to the poor, so that in practice their operation was subversive of the morals of the most numerous class, and injurious to the welfare of the whole country. In its original provisions the act of Elizabeth directed the overseers of the poor in every parish to 'take order for setting to work the children of all such parents as shall not be thought able to maintain their children,' as well as all such persons as, having no means to maintain them, use no ordinary trade to get their living by. For this purpose they were empowered 'to raise, weekly or otherwise, by taxation of every inhabitant, parson, vicar, and other, and of every occupier of lands, houses, tithes, mines, &c., such sums of money as they shall require for providing a sufficient stock of flax, hemp, wool, and other ware or stuff, to set the poor on work, and also competent sums for relief of lame, blind, old, and impotent persons, and for putting out children as apprentices.' Power was given to justices to send to the house of correction or common gaol all persons who would not work. The churchwardens and overseers were further empowered to build poor-houses, at the charge of the parish, for the reception of the impotent poor only. The justices were further empowered to assess all persons being of sufficient ability, for the relief and maintenance of their children, grandchildren, and parents. The parish officers were also empowered to bind as apprentices any children who should be chargeable to the parish.

These simple provisions were in course of time greatly perverted, and so many abuses were practically engrafted upon the statute, that it became an instrument of m general demoralization than was ever sanctioned by leg tive authority. It would greatly exceed any reaso limits to trace the progress of these abuses. The mo jurious practice was that which was established in and ab the year 1795, when, in order to meet the pressure upo labouring population caused by the high price of prov an allowance was made out of the parish fund to ever bourer in proportion to the number of his family, and out reference to his being employed or without employ This allowance fluctuated with the price of flour, and scale was so adjusted as to return to each family the which a given quantity of flour would cost beyond the in years of ordinary abundance. This plan was dou conceived in a spirit of benevolence, but the readiness which it was adopted in all parts of England clearly the general want of sound views on the subject. If t had been left to take their course in England, as they in Scotland, the labourer's wages would have enabled to purchase the same or nearly the same amount of visions and other articles of necessary consumption as b the advance, and when the necessity for such a rise in had passed away everything would have reverted former state. Under the allowance system the lab was made to receive a part of his earnings in the form parish gift, and as the fund out of which it was provide raised from the contributions of those who did not labourers, as well as of those who did, it followed th labourers were degraded from the condition of honou independence to that of parish paupers, and that th ployers, being able in part to burthen others with the ment for their labour, had a direct interest in perpet the system. Accordingly it was found that a constan rapid deterioration took place in the character of t bouring agricultural population, and that they becam able to obtain a rate of wages adequate to their without parish relief, however moderate might be the of the necessaries of life.

There are no accounts of the sums levied year by year England and Wales for the relief of the poor, before th ginning of the present century. The average expen for each of the three years 1783-4 and 5, was 1,91 the earliest account after that date is for 1801, whe expenditure amounted to 4,017,871*l*., the assessments h been more than doubled in 17 years. It will be seen the following table how little connection there has since that time between the sums expended for relief the price of corn:—

Years.	Sums expended for the Relief of the Poor.	Average Price of Wheat per Quarter.		Years.	Sums expended for the Relief of the Poor.	A
	£.	s.	d.		£.	s.
1801	4,017,871	115	11	1826	5,928,501	[illegible]
1803	4,077,891	57	1	1827	6,441,088	[illegible]
1811	6,656,105	92	5	1828	6,298,000	[illegible]
1814	6,294,581	72	1	1829	6,332,410	[illegible]
1815	5,418,846	63	8	1830	6,829,042	[illegible]
1816	5,724,839	76	2	1831	6,798,888	[illegible]
1817	6,910,925	94	0	1832	7,036,968	[illegible]
1818	7,870,801	83	8	1833	6,790,799	[illegible]
1819	7,516,704	72	3	1834	6,317,255	[illegible]
1820	7,330,256	65	10	1835	5,526,418	[illegible]
1821	6,959,249	54	5			
1822	6,358,702	43	3	1836	4,717,630	[illegible]
1823	5,772,958	51	9	1837	4,044,741	[illegible]
1824	5,736,898	62	0	1838	4,123,604	[illegible]
1825	5,786,989	66	6	1839	4,421,714	[illegible]

The extent to which the pauperising of the labour England was carried had long been viewed with alarm, had formed the subject of many parliamentary inqui without producing any substantial amendment, until a commission was appointed by the crown, consisting bishops of London and Chester, Mr. Sturges Bourne, Senior, and five other gentlemen, under whose direct quiries were carried on throughout England and Wa the actual condition of the labouring class in every pa was ascertained with the view of showing the evils of isting practice, and of suggesting some remedy. The la this inquiry was exceedingly great, but in a compar short time a Report was presented by the commissioner completely explained the operation of the law as adm tered, with its effects upon different classes, and su remedial measures. This Report was presented in Feb

1834, and was followed by the passing, in August, 1834, of the Poor Law Amendment Act, in which the principal recommendations of the commissioners were embodied.

The chief provisions of this law are—the appointment of a central board of three commissioners for the general superintendence and control of all bodies charged with the management of funds for the relief of the poor. The further appointment of nine assistant-commissioners, each one of whom should be attached to some particular district, in order to carry out practically the orders of the central board; the whole to be subject to the direction of the secretary of state for the home department. The administration of relief to the poor is placed under the control of the commissioners, who make rules and regulations for the purpose, which are binding upon all the local bodies. They are empowered to order workhouses to be built, hired, altered, or enlarged, with the consent of the majority of the board of guardians. One very important power given to them is that of uniting several parishes for the purposes of a more effective and economical administration of poor relief, but so that the actual charge in respect of its own poor is defrayed by each parish. These united parishes, or unions, are managed by boards of guardians annually elected by the rate-payers of the various parishes, but the masters of workhouses and other paid officers are under the orders of the commissioners, and removable by them. The system of paying wages partly out of poor-rates is discontinued, and except in extraordinary cases, as to which the commissioners are the judges, relief is only to be given to able-bodied persons or to their families within the walls of the workhouse. Another branch of the poor-law, which was materially altered by the act of 1834, was that relating to illegitimate children. The system of relief which was previously followed was so far from acting as a check on bastardy, that it was actually a great encouragement to it. On the birth of a bastard child, the parish officers generally obtained an order of affiliation upon the putative father, and the money paid under that order was often abusively received by the mother. In this manner a woman of loose habits was placed in more comfortable circumstances than a virtuous woman; she was even sought in marriage as a prize, while a widow with an equal number of children, having no such allowance, had no chance of making a second marriage. Under the new law, the facilities for obtaining orders upon putative fathers are diminished, the mother and child are generally relieved in the workhouse, and the money paid under the order is always received by the parish-officers and accounted for by them. The operation of this part of the law may have been productive of hardship in some cases, and it is objected that it sets little restraint on the male; but in practice it has been found to diminish in a sensible degree the proportion of illegitimate births chargeable to the parish.

These are the principal provisions of this very important statute, which, upon a careful review of all the facts which have been ascertained before and since its enactments, may be said to have answered the ends proposed. In some of its minor details it may still be susceptible of improvement. But it is no small testimony to the judgment and sagacity of those who suggested the provisions of this law, and of those who have carried them into operation, when we state that the law has now been in operation for more than five years; that it has encountered great opposition; and yet that it has been found adapted to nearly every emergency that has occurred.

The number of unions formed and declared under the Poor Law Amendment Act, from its commencement to the 31st of May, 1839, was 597, including 13,641 parishes, with a population of 11,751,342 souls. The saving in money effected by this reform is not its most important feature, although the benefit on that score will scarcely be denied. If the expenditure of 1839 be compared with that of 1834, the year which immediately preceded the operation of the act, it will appear that the diminution amounted to 1,895,540*l.*, or 29 per cent., but it is hardly fair to select for such a comparison either 1834, when the previous inquiries of the commissioners had already fixed the attention of the public upon the subject, and had forced those by whom the parish funds were administered to adopt measures of economy, or 1839, in which the high price of every kind of provisions and the consequent falling off in the demand for labour had necessarily added to the number of claimants for relief and to the extent of their demands. If, in consideration of these facts, we compare the expenditure of 1837 with that of 1833, in which two years the price of provisions was nearly the same, it will appear that the saving amounted to 2,740,658*l.*, or more than 40 per cent. Under the former administration of the law it had been customary in some parts of the kingdom for farmers to discharge their labourers in the winter, at which season they and their families became wholly chargeable to the parish. This custom no longer prevails. Labourers, being unable to obtain that kind of relief without entering the poor-house and submitting to its regulations, now refuse to work at any season for those who will not continue to employ them throughout the year, and by this means the burthen is so far thrown upon those who ought to bear it. The good effect of this change is further experienced in the greater amount of labour bestowed upon the soil, and its consequent improved productiveness, which is so much clear gain to the country.

The condition of the labouring classes in Ireland has long been a reproach to the legislation of the United Kingdom. Until the passing of the Act 1 & 2 Victoria, c. 56, which received the royal assent on the 31st July, 1838, no provision had been made by law for the relief of the helpless or the destitute in that part of the kingdom. The evils of poverty had long reached to such a height as to defy the efforts of private benevolence, and misery of the most appaling kind was of such universal occurrence, that it had almost ceased to excite commiseration or sympathy. Apart from all private and individual hardship, there resulted this public evil, that the possession of land, the only sure resource against starvation, became a matter of such urgent necessity, that the peasants bid against one another to obtain it, until the produce beyond the rent was barely sufficient for their sustenance, while the mode of cultivation was such as to keep the soil far below its productive powers. This evil still exists in nearly its full strength, and it will be many years before any considerable progress can be made in effecting a remedy, but a beginning has been made by the introduction of the Irish Poor Law, which affords relief against destitution by other means than the possession of land. The introduction of the system into Ireland is yet too recent to justify any opinion as to its success. Up to the 25th of March, 1839, the Poor Law Commissioners had succeeded in forming twenty-two unions, comprising an extent of 2,950,163 statute acres, with a population, according to the returns of 1831, amounting to 1,517,344; and arrangements had been made for declaring eighteen other unions, extending over 2,403,274 acres, and having a population of 1,140,213. In April, 1840, more than 100 unions had been formed by the commissioners in Ireland; and it is confidently expected that the whole of that country will have been divided into unions before the end of 1840.

One important consequence which has resulted from the better management of the poor, and which is calculated to produce an important effect on their future condition, is the adoption of plans for the training and instructing of children resident in workhouses. Under the administration of the unamended law little or nothing was done towards this object, and in almost every case the child whose misfortune it was to be brought up at the charge of the parish, continued through life dependent upon others for subsistence, and often followed a course of systematic dishonesty. Moral criminality in such cases might be more fairly chargeable against society, which had neglected to give a proper direction to the young pauper's habits, than against the individual delinquent; and society has paid dearly for the neglect. The system of moral, intellectual, and industrial training which has been to some extent engrafted upon the administration of the amended law, is calculated to bring up the children of the workhouse to be useful members of society. It has been well observed in a Report on this subject drawn up by Dr. Kay, that 'the state is *in loco parentis* to the pauper children who have no natural guardians, and the interest it has in the right discharge of its responsibilities may be illustrated by supposing the government had determined to require direct instead of indirect service in return for education. If the army and navy were recruited by the workhouse children, it is evident that it would be the interest of the state to rear a race of hardy and intelligent men—instructed in the duties of their station—taught to fear God and honour the queen. The state has not less interest, though it may be less apparent, in supplying the merchant service with sailors, and the farms and the manufactories of the country with workmen, and the households of the upper and middle classes with domestic servants: it has the most positive and direct interest in adopting measures to prevent the rearing of a race of prostitutes and felons. It may be questionable how far it would be proper to permit the pauper children to volunteer for service in the army and navy, and to train them accordingly; but the duty of rearing these children in religion and industry, and of imparting to them such an amount of secular knowledge as may fit them to discharge the duties of their station, cannot be doubted.'

PAUSA'NIAS, son of Cleombrotus, was of that royal house in Sparta which traced its descent from Eurysthenes. Aristotle calls him 'king,' but he only governed as the cousin-german and guardian of Pleistarchus, who succeeded to the throne on the death of Leonidas.*

Pausanias comes principally into notice as commander of the Grecian army at the battle of Platæa. The Spartan contingent had been delayed as long as was possible, but owing to the representations made by the Athenian ministers at Lacedæmon, it was at last despatched, though not until the Persians had advanced into Bœotia. This delay had however one good effect, that of taking the Argives by surprise, and defeating their design of intercepting any troops hostile to Persia, which might march through their territory. The Spartans, under the command of Pausanias, got safe to the Isthmus, met the Athenians at Eleusis, and ultimately took up that position which led to the battle of Platæa.

The result is well known. Pausanias, elated by his success, took all methods of showing his own unfitness to enjoy good fortune. Being sent with twenty ships, and in the capacity of commander-in-chief of the confederates, to the coast of Asia Minor, by his overbearing conduct he disgusted the Greeks under his command, and particularly those Asiatic Greeks who had lately revolted from Persian rule. To his oppression he added an affectation of Eastern luxury; and what we know of Spartan manners seems to lead to the conclusion that no mixture could possibly be more repugnant to persons accustomed at once to Persian elegance and Ionic refinement, than a clumsy imitation of both, such as the conduct of Pausanias probably presented. Prejudice in favour of the Athenians, who were of the Ionic race, was also active; intrigues commenced, the Athenians encouraged them, and Pausanias was recalled.

Much criminality was imputed to him by those Greeks who came to Sparta from the seat of war, and his conduct was clearly more like the exercise of arbitrary power than of regular military command. He was accordingly put on trial. Private and public charges was brought against him; from the former he was acquitted, but his Medism (or leaning to Persia) seemed to be clearly proved. Dorcis was sent in his place, but the Spartan supremacy had received its death-blow, and thenceforward Lacedæmon interfered only sparingly in the prosecution of the contest with Persia. Pausanias however, with the feelings of a disappointed man, went in a private capacity to the Hellespont, on pretence of joining the army. After the taking of Byzantium, which happened during his command, he had winked at the escape of Persian fugitives of rank, and by means of an accomplice had conveyed a letter to the Persian monarch, containing an offer to subjugate Greece to his dominion, and subjoining the modest request of his daughter to wife. A favourable answer had elated him to such a degree as to disgust the allies in the manner already stated. On his second journey he was forcibly prevented from entering Byzantium, upon which he retired to a city in the Troad. There too his conduct was unfavourably reported at home, and a messenger was despatched with orders for his immediate return, under threats of a declaration of war against him. Pausanias returned, but it was still hard to bring home any definite charge against him, and the Spartans were shy of adducing any but the strongest evidence. At last however one of his emissaries having discovered that he was, like all his predecessors, the bearer of orders for his own death, as well as of his master's treason, denounced him to the Ephori. By their instructions, this slave took sanctuary, and through a partition made by a preconcerted plan in a hut where he had found refuge, they had the opportunity of hearing Pausanias acknowledge his own treason, during a visit which he paid to his refractory messenger. The Ephori proceeded to arrest Pausanias, but a hint from one of their number enabled him to make his escape to the temple of Minerva of the Brazen House, only however to suffer a more lingering death. He was shut up in the temple, and, when on the brink of starvation, brought out to die (B.C. 467). By such means Spartan superstition was satisfied, and the actors in the tragedy held themselves innocent of sacrilege. Thirty-five years after, a contest arose on this very point. [PERICLES.]

The Hippodrome of Constantinople still contains, although sadly mutilated, the brazen tripod which Pausanias dedicated at Delphi, with an inscription to the effect that it was in gratitude for having destroyed the Persian host.

(Thucyd., i. 132, &c.; Gibbon's *Decline and Fall of the Roman Empire*, vol. iii., ch. 17, p. 22, ed. 8vo., note; and Clarke's *Travels*, ii., p. 58.)

PAUSA'NIAS, the author of the 'Description or Itinerary of Greece' (Ἑλλάδος Περιήγησις), appears, according to his own account, to have been a native of Lydia (v. 13, 7); but the passage cited hardly proves this. Little or nothing is known of him, except what may be collected from his own work. The 'Description of Greece' consists of ten books: the first contains the description of Attica and Megaris; the second, Corinthia, Sicyon, Phlius, and Argolis; the third, Laconica; the fourth, Messenia; the fifth and sixth, Elis; the seventh, Achæa; the eighth, Arcadia; the ninth, Bœotia; and the tenth, Phocis.

It appears from incidental notices in the work, that Pausanias not only visited the places which he has described, but also many other remote parts. He must have been at the temple of Ammon, in Libya (ix. 16, 1); at Cnossus in Crete; in the island of Delos (ix. 40, 3); at Capua in Campania (v. 12, 3); and at Rome (viii. 46, 5). A traveller who visited all these places must have visited many others. Pausanias made his tour of Greece in the time of Antoninus Pius. In speaking of the Odeion of Herodes, he says that he had not described it in his account of Attica (i.), because it was not built when he was writing that part of his work (vii. 20, 6). Herodes died in Attica about the end of the reign of M. Aurelius.

The work of Pausanias is different in character from that of Strabo: it contains no general geographical description of the surface of the country; it is a description of places only. He describes each place as he comes to it, and every object in each place in the order in which it comes before him. His description is minute and generally complete; he seems to have busied himself as a man would do if he were making an inventory or catalogue. There is no attempt to set off the things which he describes by any ornament of language; and yet such is the power of beautiful objects when portrayed in the simplest words, that some of his descriptions are beautiful merely by virtue of the beauty of the objects described. Buildings, monuments, statues, and paintings were the chief objects which he has registered: in connection with them he collected and recorded local traditions and mythological stories in abundance. Natural objects, as rivers, mountains, caves, are also noticed in his description; but nearly always in connection with the mythological stories attached to them. Yet he was a careful observer of natural phenomena, and many curious facts of this kind are scattered through his work. In describing a kind of marble (λίθος κογχίτης) which was much used in the buildings of Megara, he observes that it is very white, softer than other stone, and full of sea-shells (i. 44, 6). In another passage (vii. 24) he has some curious remarks on earthquakes. His work also abounds in historical facts, many of which are exceedingly valuable. He not unfrequently digresses, something after the manner of Herodotus, whom he resembles in some degree, and consequently a man will find in his work much curious matter that he would never expect to see there. Pausanias was superstitious, and it would be hard to find an antient usage, however absurd, which he does not treat with respect. This work contains an inexhaustible treasure of facts, historical, topographical, and mythological its value and accuracy as a topographical description have been well tested by some of our own countrymen, especially Leake. The style of Pausanias has often been censured as obscure, and his sentences as ill constructed. There is some truth in this; but if we deduct the passages that are corrupt, and some that are scarcely intelligible without ocular view of the places described, it can hardly be said that he is a difficult writer to those who have studied him.

Pausanias, in his numerous accounts of works of art, although he seems to have described with equal attention and indiscriminately all that came under his eye, has left us many notices of the highest value; and several of the most important productions of antient painting would be known to us merely by name but for his circumstantial detail, as the great works of Polygnotus at Delphi ('Phocica,' c. 25-31), and the paintings by various artists in the Poecile at Athens, and others of minor importance.

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* Thucydides however has an expression (i. 132) which almost appears to justify this use of the word βασιλεύς, 'king.'

Although Pausanias made his tour of Greece nearly five hundred years after the flourishing period of Grecian art, and notwithstanding the extensive system of plunder which had been carried on for centuries, he still found several hundred specimens of painting; and of sculpture, probably owing to the more durable and less portable nature of the material used in that art, he found a much greater number. He has named altogether about two hundred artists of all descriptions: nine only however are painters of great fame, Polygnotus, Micon, Panaenus, Euphranor, Parrhasius, Nicias, Apelles, Pausias, and Protogenes. The proportion of sculptors is much greater, for the reason already mentioned: we have notices of works of Phidias, Alcamenes, Polycletus, Myron, Naucydes, Calamis, Onatas, Scopas, Praxiteles, Lysippus, and others. Though Pausanias, in matters of art, was certainly not a critic, yet perhaps in no instance does he confound an obscure with a celebrated name; his attention appears to have been generally engrossed by the parts and detail of what he describes, and seldom, if ever, by the style and composition, or any of the higher merits of art. This has been adduced as a serious objection to his work; but so far from that, it rather enhances its value than otherwise. Pausanias has described impartially all that he saw, without distinction of either style or school; whereas an artist probably, or even a connoisseur, biassed by the prejudices of his own peculiar education, would have selected only that which might have happened to coincide with his own taste, neglecting everything else as unworthy of notice, and thus handing down only a very partial and imperfect account. Certainly no such objection can be made to the work of Pausanias. On the contrary, somewhat more of system would have been desirable in the descriptions of the more important works; 'but the minute and scrupulous diligence,' says Fuseli, 'with which he examined what fell under his own eye, amply makes up for what he may want of method or of judgment. His description of the pictures of Polygnotus at Delphi, and of the Jupiter of Phidias at Olympia (v. 10), are perhaps superior to all that might have been given by men of more assuming powers, mines of information and inestimable legacies to our arts.' (Introduction, *Works*, vol. ii.)

The first edition of Pausanias is that of Venice, 1516, fol., Ald.: it is said to be very incorrectly printed. An edition, begun by Xylander and finished by Sylburg, was printed at Frankfort, 1583, fol., and again at Hanau, 1613. The edition of Kühn, Leipzig, 1696, fol., is accompanied with the Latin translation of Romulus Amasaeus, which first appeared at Rome, 1547, 4to. The edition of Siebelis, 5 vols. 8vo., Leipzig, 1822, contains a corrected text and the translation of Amasaeus improved, with an elaborate commentary and complete index. The edition of Bekker, Berlin, 1826-1827, 2 vols. 8vo., is an exact copy of the Paris MS., 1410, in every instance in which the editor has not noticed his deviation from that text: this edition has a very good index. A new German translation, by Wiedasch, appeared at Munich, 1826-1833. The best French translation is by Clavier. There is an English translation by Thomas Taylor, the translator of Aristotle and Plato.

PAU'SIAS, a native of Sicyon, after he had learned the rudiments of his art from his father Brietes, studied encaustic in the school of Pamphilus, where he was the fellow-pupil of Apelles and Melanthius. Pausias was the first painter who acquired a great name for encaustic with the cestrum: he excelled particularly in the management of the shadows; his favourite subjects were small pictures, generally of boys, but he also painted large compositions. He was the first also who introduced the custom of painting the ceilings and walls of private apartments with historical and domestic subjects: the practice however of decorating ceilings simply with stars or arabesque figures (particularly those of temples) was of very old date.

Pausias undertook the restoration of the paintings of Polygnotus at Thespiae, which had greatly suffered through time, but he was judged inferior to his antient predecessor, for he contended with weapons not his own; he generally worked with the cestrum, but the paintings of Polygnotus were with the pencil, which Pausias consequently also used in this instance.

The most famous work of Pausias was the *sacrifice of an ox*, which in the time of Pliny was in the hall of Pompey. In this picture the ox was foreshortened, but to show the animal to full advantage, the painter judiciously threw his shadow upon a part of the surrounding crowd, and he added to the effect by painting a dark ox upon a light ground.

Pausias in his youth loved a native of his own city, Glycera, who earned her livelihood by making garlands of flowers and wreaths of roses, which led him into competition with her, and he eventually acquired great skill in flower painting. A portrait of Glycera with a garland of flowers was reckoned amongst his masterpieces; a copy of it was purchased by L. Lucullus at Athens, at the great price of two talents (about 432*l.*). This picture was called the 'Stephanoplocos,' or garland wreather. Pausias was reproached by his rivals as being a slow painter, but he silenced the censure by completing a picture of a boy, in his own style, in a single day, which on that account was called the 'Hemeresios,' or work of a day. (Pliny, *Hist. Nat.*, xxxv. 11, 40.)

Pausanias mentions two pictures by Pausias at Epidaurus, the one a Cupid with a lyre in his hand, his bow and arrows lying by his side; the other, the figure of Methe, or drunkenness, drinking out of a glass, through which his face was seen (ii. 27). Pliny mentions two pupils of Pausias, his son Aristolaus, a painter 'e severissimis,' and a certain Mechopanes, who was distinguished for a high finish and an excessive use of yellow: he was also hard in colouring, yet he had his admirers notwithstanding these peculiarities. We may collect from the allusion of Horace (*Sat.*, ii. 7, 95) that the pictures of Pausias were well known at Rome.

PAUSE. [ORATORY.]

PAU'SSIDÆ, a family of Coleopterous insects, the precise affinities of which have not yet been satisfactorily determined. By Latreille the Paussi are placed between the *Scolytidæ* and the *Bostrichidæ*; but Mr. Westwood (who has devoted much attention to this group of beetles and has published a monograph on them in the sixteenth volume of the 'Linnean Transactions') is of opinion that the Paussidæ possess affinities with the Trogositarii, and are still more nearly allied to the Cucujidæ.

These insects are usually of small size, the largest known species being less than half an inch in length, and their colouring generally consists of various shades of brown, and they are not unfrequently adorned with black markings. The form of the body is generally short, rather broad, and somewhat depressed; the head, in most of the species, is free (*i.e.* not hidden by the thorax), and joined to the thorax by a kind of neck; the thorax is narrower than the elytra, and is almost always divided transversely near the middle by an indentation, in which case the fore part is usually broader than the hinder, produced at the sides so as to form projecting angles; the elytra are rather soft, and in most of the species are of subquadrate form, truncated at the apex, and leaving exposed the terminal segment of the abdomen; the outer posterior angle of the elytra is generally furnished with a small tubercle. The legs are in most species broad and compressed, and of moderate length; the tarsi are five-jointed in some, and apparently in others there are but four. The antennæ are remarkable for their large size and curious forms; in most of the species they consist of a large inflated club, about equal in size to the head and thorax taken together, and varying in form according to the species: the most common form of this knob is that of an oval more or less elongated, and with an angular projection on the outer side at the base; this club is joined by a smaller joint to the head.

Between twenty and thirty species of this family are known, a great portion of which are figured and described by Mr. Westwood in the monograph before alluded to, and in a supplement to this monograph published in the second volume of the 'Transactions of the Entomological Society,' to which works the reader is referred for a more detailed account of these very curious insects. Of their habits little is known; they are confined to the Old World, and almost entirely to the tropical portions. They are said to be nocturnal, and are supposed to live in wood or under the bark of trees: most of the specimens in cabinets have been found in newly-built houses. One species is said, when touched, to make discharges of some volatile fluid, in the same manner as the species of *Brachinus*.

The family Paussidæ contains the six following genera: *Paussus*, *Hylotorus*, *Platyrhopalus*, *Cerapterus*, *Pentapla-*

tarthrus, and *Trochoideus*. In the first three of these genera the antennæ are two-jointed, and the abdomen is of a quadrate form.

The genus *Paussus* is distinguished by the absence of ocelli on the head, and by the ultimate joint of the labial palpi being elongated.

In *Hylotorus* the head is furnished with two ocelli, and this genus moreover differs from *Paussus* in having the head immersed in the thorax; the great club of the antenna is thickest at the base, and somewhat curved and pointed at the opposite extremity.

Platyrhopalus has all the essential characters of *Paussus*, but differs in having the joints of the labial palpi equal.

In the genus *Cerapterus* the antennæ are large, broad, and compressed, and appear to be composed of ten joints, most of which are very distinct; the terminal joint is the largest; the preceding joints (if we except the basal one) are transverse and all of equal width.

In *Pentaplatarthrus* the antennæ gradually increase in size from the base to the apex, and are composed of six joints. The basal joint is longer than broad; the second is transverse; the three following joints are nearly equal in width and length, and the terminal joint is almost spherical.

The genus *Trochoideus* differs from all the preceding genera in having an ovate form of body; the thorax is rather narrower than the elytra; its sides are rounded, the broadest part in front, and there is apparently no transverse indentation. The head is large and rounded, and deeply inserted in the thorax. The antennæ are composed of two small basal joints, which are longer than broad, and terminate in a large oval club. The legs are more slender than in other species of this family, and the tarsi are represented as having only four joints.

PAUW, CORNELIUS, born at Amsterdam in 1739, studied at Göttingen, and was afterwards made canon of Xanten, in the duchy of Cleves. He applied himself to literature, and wrote several works in French on the history and physiology of various nations and countries. His 'Recherches historiques sur les Americains' contain some curious information, many sensible reflections, and also many unsupported assertions set forth in a dogmatic tone. Pauw had not visited America, and his object seems to have been to collect all the passages which he could find in other writers, and which could support some preconceived opinion of his concerning the great inferiority of that part of the world, its productions, and its native races. (Pernety, *Dissertation sur l'Amérique et les Américains contre les Recherches historiques de M. de Pauw*, which is found at the end of some editions of Pauw's work.) In his chapter on Paraguay, Pauw shows himself particularly hostile to the Jesuits. His 'Recherches sur les Grecs,' in which he had better guides, is written with greater sobriety of judgment; but even in this work, his dogmatic spirit is perceptible. Pauw published also 'Recherches sur les Egyptiens et les Chinois.' The French Revolution, and the subsequent invasion of the duchy of Cleves, deprived Pauw of his peace of mind. He became dejected, and burnt all his papers, among others his 'Recherches sur les Germains,' which is said to have been the most elaborate of his works, but which was never printed. He died at Xanten, in 1799.

Another member of the same family, John Cornelius Pauw, born at Utrecht towards the end of the seventeenth century, was a good classical scholar, published editions of several Greek classics, and wrote notes on Pindar, and also a 'Diatriba de Alea Veterum.'

PAUXI. [CRACIDÆ, vol. viii., p. 129.]

PAVEMENT. [ROADS.]

PAVI'A, THE PROVINCE OF, in the Lombardo-Venetian Kingdom, is bounded on the north by the province of Milan, on the east by that of Lodi, west by the Sardinian territory, from which it is separated by the river Ticino, and on the south partly by the Sardinian territory and partly by the duchy of Parma, being separated from both by the Po. The province of Pavia is the smallest of the Lombard provinces, but it is one of the most fertile, being entirely in the fine plain of the Po. It produces corn, wine, fruit, hemp, and has good pasture land. The length is about 40 miles from north-west to south-east, but the breadth does not exceed 10 miles. The population amounts to 157,600 inhabitants. (*Bollettino Statistico di Milano* 1838.) The province is divided into eight districts: Pavia, Belgioioso, Bereguardo, Corte, Olona, Rosate, Binasco, Abbiate Grasso: reckoning in all 193 communes. There is no town of any importance except Pavia, but there are numerous large villages. Two navigable canals, the Naviglio Grande and the Canale of Pavia, cross the province, and supply a water communication between Milan and the Lago Maggiore and the Ticino and Po, and by the latter river with the Adriatic.

PAVI'A, THE TOWN OF, is situated on the left or eastern bank of the Ticino, a few miles above its junction with the Po. A handsome covered bridge over the river connects Pavia and the suburb on the right bank, called Borgo Ticino. A fine street which crosses the town in its length leads to this bridge. The cathedral, which is a modern structure, was rebuilt in the last century; it contains some good paintings. The oldest church in Pavia, and perhaps one of the oldest in Italy, is that of San Michele, which is asserted by D'Agincourt, Rosmini, and other antiquarians, to have been built in the sixth century of our æra; whilst another writer, San Quintino (*Dell' Architettura Italiana durante la Dominazione Longobardica*, Brescia, 1829), maintains that the old church was burnt, together with the greater part of the town, by the Hungarians in the early part of the tenth century, and that the present church was built in the eleventh century. Several old and curious basso-rilievos adorn this church, as well as some frescoes of the age of Giotto. One of the rilievos on the outer wall of the church seems to belong to an early period of the Longobard dominion in Italy, when that nation was still Arian: it represents the annunciation of the Virgin, in which the child is represented as already grown up. (Valéry, *Voyages en Italie*.) If this be a correct interpretation of this monument, it would go far to prove that the church really dates from the sixth century, before the Longobards forsook the Arian creed through the influence of Theodolinda, their queen. The vast church Del Carmine, which was built in the fourteenth century, contains some valuable paintings. That of Santa Maria Coronata was built by Bramante, and is also rich in paintings. The once handsome church of San Pietro 'in Cielo d'oro,' noticed by Dante (*Paradiso*, x.), as containing the tomb of the learned Boëthius, the minister of Theodoric, has long since been suppressed, with the adjoining monastery, and, when Valery visited it twelve years since, was used as a military storehouse. It was in his confinement at Pavia that Boëthius composed his book 'On the Consolations of Philosophy.' In the same church of San Pietro was the mausoleum of Liutprand, one of the most illustrious of the Longobard kings, which has also disappeared.

Pavia is chiefly known for its university, the first in Italy, which, among its professors in our own times, can boast of the names of Scarpa, Volta, Configliacchi, Brugnatelli, Tamburini, and other distinguished men. The university contains thirteen colleges; and the faculties are those of law, medicine, and philosophy. The instruction is liberal and untrammelled, and the professors are well remunerated: several chairs, such as those of statistics, diplomacy, history of philosophy, and pedagogy, have been added of late years. Pavia has long been renowned for its medical and surgical instruction. The former library of the university was plundered by the French in the wars of Louis XII. and Francis I; the present library was formed in the last century by Count Firmian, the enlightened minister of the empress Maria Theresa, who was the restorer and patroness of the university. A museum of natural history, a cabinet of anatomy, and a botanical garden are annexed to it. The number of students is about 1400. Three colleges, Caccia, Borromeo, and Ghislieri, the first two founded by the noble families of those names, and the third by Pope Pius V., support about 120 students gratuitously. The college Borromeo is a magnificent building. Further details concerning the university of Pavia are given in Nos. 5 and 16 of the 'Quarterly Journal of Education.' Pavia contains 23,600 inhabitants, according to the census of 183[illegible]. It is a bishop's see, has a large hospital, a house for foundlings, and other benevolent institutions. Several palaces of the nobility contain galleries of paintings.

Pavia, called Ticinum by the Roman writers, was a town of Cisalpine Gaul, but little mention is made of it in Roman history. The name of Pavia, or Papia, is first mentioned in the history of the Longobards, who made it the residence of their kings, whose palace however no longer exists. It went through the same vicissitudes as the other Lombard towns; was a republic, afterwards had its tyrants, then became subject to the dukes Visconti of Milan, and lastly came under the dominion of the House of Austria. It was near Pavia that Francis I. was defeated and taken prisoner by the troops of Charles V. in 1525. In the years 1527 and 1528, it was twice taken and plundered by the French, and almost entirely depopulated. In 1796, after Bonaparte had invaded Lombardy, an insurrection against the French broke out at Pavia, which was put down by force, and the town given up to indiscriminate pillage.

Five miles distant from Pavia, on the road to Milan, is the splendid Carthusian monastery suppressed by Joseph II., which had an income of about one million of livres (40,000*l.*). It was built by Gian Galeazzo Visconti, duke of Milan, whose monument is in the church: the church is rich in sculptures, marble, and fresco paintings.

(*La Certosa di Pavia descritta ed illustrata con Tavole*, by Durelli, fol., Milan, 1823-30.)

PA'VIA is a small division of the natural order Æsculaceæ, differing from Æsculus itself in little except its converging petals and spineless fruit. It consists of small trees or bushes with yellow or red flowers, inhabiting North America, and often cultivated in shrubberies under the name of the Yellow or Scarlet Horse-chesnut. Two species, P. indica and Punduana, have also been found in the colder parts of India, but they have not yet been introduced into our gardens. With us the American species are usually short-lived and of no value for their timber; the former circumstance is probably owing to their being grafted upon the common horse-chesnut, a stock that does not suit them. They should always, if possible, be raised from seeds, which are annually imported from the United States.

PAVING. [ROADS.]

PAVO (the Peacock), a constellation of Bayer, which occupies a part of the space situated between Sagittarius and the South Pole. Its principal stars are as follows:—

Character. (None in Bayer.)	No. in Catalogue of		Magnitude.
	Lacaille.	Astron. Society.	
η	1449	2025	
ν	1512	2119	
ζ	1525	2138	
	1533	2155	
θ	1536	2158	
λ	1541	2166	
ε	1615	2325	
δ	1635	2351	
α	1657	2398	
υ	1674	2421	
β	1677	2426	
γ	1724	2526	

PAVO'NIDÆ, Peacock family, Mr. Swainson's name for a family of Rasorial birds.

The genus *Pavo* of Linnæus stands next to *Didus* [DODO] in the *Systema Naturæ*, and is immediately succeeded by *Meleagris*, which is followed by *Crax*, *Phasianus*, *Numida*, and *Tetrao*.

Mr. Vigors admits no such family as *Pavonidæ* into his group of the *Rasores*; but its place is supplied by the *Phasianidæ*, a family which does not exist in Mr. Swainson's system. Mr. Vigors enters the family of *Phasianidæ* by the genus *Meleagris*, leaving the *Columbidæ* by the *Crowned Pigeon* of India (*Lophyrus*, Vieill.), which possesses the strongly formed leg and foot of *Meleagris*, but without the spurs, while at the same time it retains the bill of *Columba*. *Meleagris*, then, in conjunction with *Pavo*, Linn., and *Polyplectron*, Temm., commences Mr. Vigors's group of *Phasianidæ*, by the greater length of the hinder toe, in which character it resembles the *Columbidæ*, with the exception of its being articulated higher on the tarsus. *Lophorus*, Temm., and *Gallus*, Brisson, appear to Mr. Vigors to hold an intermediate station between the groups just mentioned and the true *Phasianus*, which, in his opinion, forms the type of the family. Some groups deviating from the latter genus (*Argus*, Temm., for instance) unite themselves, he thinks, to *Numida*, Linn., by the absence of the spur on the tarsus. The last-mentioned genus reconducts us, according to his views, to *Meleagris*, which it resembles in general appearance; while, at the same time, it approaches it with reference to the integrity of the tarsus, that of the true *Meleagris* possessing but a short and blunt excrescence, which exhibits only the rudiments of a spur. (*Linn. Trans.*, vol. xiv.)

Cuvier makes his *Paons* consist of the true peacocks (*Pavo*, Linn.) and *Lophophorus*. This group is followed by the *Dindons* (*Meleagris*, Linn.); the *Peintades* (*Numida*, Linn.); and the *Faisans* (*Phasianus*, Linn., including the cocks and hens (*Gallus*, Briss.); the true pheasants (*Phasianus Colchicus*, &c., including *Argus*, Temm.); the crested pheasants (*Houppifères*, Temm., *Phasianus ignitus*, &c.); the *Tragopans* (*Tragopan Satyrus*, &c.); and *Cryptonyx*. The *Tetraonidæ* immediately follow.

Mr. Swainson makes the *Pavonidæ*, the first family of the order *Rasores*, according to his arrangement, consist of the genus *Pavo*, with the subgenera *Argus*, *Polyplectron*, and *Meleagris*; the genus *Phasianus*, with the subgenera *Phasianus*, *Nycthemerus*, and *Ceriornis* (*Tragopan*); the genus *Gallus*; the genus *Lophophorus*; and the genus *Numida*.

Mr. G. R. Gray makes the *Pavoninæ* (the first subfamily of the *Phasianidæ*, according to his arrangement) consist of the genera *Polyplectron*, *Crossoptilon*, Hodgson (type *C. Tibetanus*), and *Pavo*. The fourth subfamily, according to the same author, is composed of the genera *Meleagris*, *Numida*, *Guttera*, and *Acryllium* (type *A. vulturinum*, Hardw.). (*List of the Genera of Birds*, 1840.)

In this work, *Phasianus*, with its subgenera, *Tragopan*, *Gallus*, and *Euplocamus*, are treated of under the title PHEASANTS.

Pavo. (Linn.)

Generic Character.—*Bill* convex, rather stout, curved towards the end, smooth at the base; cheeks partially naked; *nostrils* basal and open; head plumed and surmounted with an aigrette-like crest; sixth *quill* longest; tail-feathers eighteen; *tail-coverts* very long, large, and extensible in the male.

Two species only of this magnificent genus are recorded. One, *Pavo cristatus*, the *Common Peacock*, is universally well known.

The head is surmounted by an aigrette of four and twenty upright feathers. In the male the tail-coverts consist of feathers with loose barbs and of unequal size, the upper ones shortest, each terminated by numerous eyes or circlets of a metallic iridescent brilliancy: these the bird has the power of erecting into a circle or wheel, which presents, when the sun shines on it, an object of dazzling splendour which sets all description at defiance. The female has the aigrette, but has not the splendid ornament with which the male is gifted: her colours generally are sombre.

People usually talk of the peacock spreading its *tail*, but the rich display is composed, principally, of the tail-coverts. White soon saw the distinction. 'Having to make a visit to my neighbour's peacocks, I could not,' says he, 'help observing that the trains of those magnificent birds appear by no means to be their tails, those long feathers growing not from the *uropygium*, but all up their backs. A range of short brown stiff feathers, about six inches long, fixed in the *uropygium*, is the real tail, and serves as the fulcrum to prop the train, which is long and top-heavy when set an end. When the train is up, nothing appears of the bird before but its head and neck; but this would not be the case were those long feathers fixed only in the rump, as may be seen by the turkey-cock when in a strutting attitude. By a strong muscular vibration these birds can make the shafts of their long feathers clatter like the swords of a sword-dancer; they then trample very quick with their feet, and run backwards towards the females.'

This species is spread over the north of India and the islands of Malaisia in its natural state. It is the *Mohr* of the Mahrattas, according to Colonel Sykes, who describes the wild bird as abundant in the dense woods of the Ghauts; it is readily domesticated, and many Hindu temples in the Dukhun (Deccan) have, he tells us, considerable flocks of them. On a comparison with the bird as domesticated in Europe, the latter, both male and female, was found by the Colonel to be identical with the wild bird of India.

Colonel Williamson, in his account of peacock-shooting, states that he had seen about the passes in the Jungletery district surprising quantities of wild pea-fowls. Whole-woods were covered with their beautiful plumage, to which the rising sun imparted additional brilliancy. Small patches of plain among the long grass, most of them cultivated, and with mustard, then in bloom, which induced the birds to feed, increased the beauty of the scene. 'I speak within bounds,' continues Colonel Williamson, 'when I assert that there could not be less than twelve or fifteen hundred peafowls, of various sizes, within sight of the spot where I stood for near an hour.'

According to the same authority it is easy to get a shot in a jungle, but where the birds flocked together, which they do to the amount of forty or fifty, there was greater difficulty. Then they are not easily raised, and run very fast, so fast indeed, that the Colonel doubts whether a slow spaniel could make them take wing. They fly heavy and strong, generally within an easy shot: if winged only, they generally escape from their swiftness of foot. They roost on high trees, into which they fly towards dusk.

This is the *ταών* (Taon) and *ταώς* (Taos) of the Greeks; *Pavus* and *Pavo* of the antient Italians; *Pavon*, *Pavone*, and *Pagone* of the modern Italians; *Paon* of the French; and *Pfau* of the Germans.

Buffon and others say that the bird was introduced into Greece, whence it has been spread throughout Europe, in the time of Alexander the Great. Others again, with greater show of reason, assert that it was brought to Greece before the time of Pericles. Certain it is that the peacock is mentioned in two plays of Aristophanes, the 'Acharnians' and the 'Birds,' the first of which was represented in the third year of the 88th Olympiad, and the last in the second year of the 91st. Now Alexander was not born till the second year of the 98th Olympiad. Athenæus quotes from other old poets—Eupolis, for instance; nor does Aristotle speak of the bird in any other terms than those which would indicate that it had become very well known when he wrote: 'Some are jealous and vain like the peacock,' says Aristotle, when speaking of the qualities exhibited by certain animals. (*Hist. Anim.*, I. 1.)

Sir Robert Heron gives the following interesting account of the habits of these birds in a domesticated state:—'1814.—For a good many years I have attended to the habits of *Peafowl*, and for the last eleven have written down my observations. I find the individuals to differ as much in temper as human beings: some are willing to take care of the young ones of others, whilst some have pursued and killed them, and this whether they had a brood of their own or not. Some cocks have assisted in the care of young ones, whilst others have attacked them. An early hen frequently has a brood herself the next year. Age makes no difference in the number of the brood. I have had six from a hen a year old, and one from an old hen. The hens have frequently a great preference to a particular peacock. They were all so fond of an old pied cock, that one year, when he was confined in view, they were constantly assembled close to the trellice walls of his prison, and would not suffer a japanned peacock to touch them. On his being let out in the autumn, the oldest of the hens instantly courted him, and obtained proofs of his love in my presence. The next year he was shut up in a stable, and the hens then all courted his rival; for the advances in these birds are always made by the female.

'The japanned breed are, I believe, a variety originating in England. In Lord Brownlow's numerous breed of common, white, and pied, the japanned suddenly, in my memory, appeared amongst them. The same thing happened in Sir J. Trevelyn's flock of entirely the common sort; also in a breed of common and pied given by Lady Chatham to Mr. Thoroton; and in both cases to the extinction of the previously existing breed.' (*Zool. Proc.*, 1835.) The common peacock varies in its plumage accidentally. Thus there are pied varieties, and one entirely white. In this last the eyes or circlets of the train are shadowed out, as it were.

The female, like those of several other gallinaceous birds, is subject to putting on the plumage of the male when unfit for the reproduction of the species. Thus Lady Tynte had a favourite pied pea-hen, which had produced chickens eight several times. John Hunter relates that this bird having moulted when about eleven years old, the lady and family were astonished by her displaying the feathers peculiar to the other sex, and appearing like a pied peacock. In this process the tail (train), which became like that of the cock, first made its appearance after moulting. In the following year, having moulted again, she produced similar feathers. In the third year she did the same, and, in addition had spurs resembling those of a cock. She never bred after this change of plumage, and died the following winter in the hard frost of 1775-6. This specimen was in Sir Ashton Lever's museum, and the trunk with the atrophied ovary and oviduct, presented by Hunter, is preserved in the museum of the Royal College of Surgeons. In Hunter's account there is a note anticipating objections which will occur to most. It might be supposed, as is observed in this note, that this bird was really a cock which had been substituted for the hen, but the following facts put the point beyond doubt. First, there was no other pied pea-fowl in the county. Secondly, the hen had nobs on her toes, which were the same after her change. Thirdly, she was as small after the change as before; therefore too small for a cock. Fourthly, she was a favourite bird, and was generally fed by the lady, and used to come for her food, which she still continued to do after the change in her feathers.

Utility to Man.—To say nothing of this beautiful bird as an ornament to our parks and homesteads, it has recommendations of a more substantial nature. M. Lesson indeed says, 'leur chair est sèche et coriace, leur cri est rauque et désagréable.' We have nothing to say against the character given of their cry; but if we are to come to the other test, and sacrifice such a brilliant bird, we have only to observe that though the flesh of an old peacock or pea-hen may be—no doubt it is—dry and leathery, that of a young one is juicy and sapid. In antient times no great feast was complete, even in this country, without this bird, which was presented by the sewer well cooked, but in all its gorgeous plumage; and the adventurous knight made his solemn vow before the peacock and the ladies.

Pavo Japonensis, Aldrov.

Mr. Bennett, who had an opportunity of examining two living birds in the garden of the Zoological Society of London, in addition to stuffed specimens, gives the following accurate description of this species. Prevailing tints blue and green, varying in intensity and mutually changing into each other according as the light falls more or less directly upon them. In size and proportions the two species are nearly similar, but the crest of *Pavo Javanicus* is twice as long as that of *P. cristatus*, and the feathers of which it is composed are regularly barbed from the base upwards in the adult bird, and of equal breadth throughout. Head and crest interchangeably blue and green. A naked space on the cheeks, including the eyes and ears, is coloured of a light yellow behind, and bluish-green towards its fore-part. The feathers of the neck and breast, which are broad, short, rounded, and imbricated like the scales of a fish, are at their base of the same brilliant hue as the head, and have a broad, lighter, somewhat metallic margin; those of the back have still more of the metallic lustre. The wing-covers are of the general hue, with a deeper tinge of blue; the primary quill feathers are light chesnut. The tail-feathers and their coverts (train) are of a splendid metallic brown, changing into green; their barbs are extremely long, loose, silky, and somewhat decomposed; and the latter are almost all terminated by ocellated spots similar to those which mark the tail (train) of the common species, and of nearly the same size. As in it, they are of beautiful deep purple in the centre, which is about the size of a shilling; this is surrounded by a band of green, becoming narrow behind, but widening in front and filling up a kind of notch that occurs in the blue; then comes a broad brownish band; and lastly, a narrow black ring, edged with chestnut, all beautifully metallic, or rather presenting the hues of various precious stones when viewed in certain lights. Bill of a greyish horn-colour, rather longer and more slender than in the common species; iris deep hazel. Legs strong, naked, reticulated, dusky black; spurs large, and of the same hue. (*Gardens and Menagerie of the Zoological Society.*)

The bird above described is the *Pavo muticus* of Linnæus, who, as the name implies, described it as being devoid of spurs, relying probably on Aldrovandus, whom he quotes, and who figures it without spurs, describing it under the name of *Pavo Japonensis*. It is the *Japan Peacock* of Latham, the *Pavo spiciferus* of Vieillot, the *Pavo Aldrovandi* of Wilson, and *Pavo Javanicus* of Dr. Horsfield, who saw it in Java. Of these names, that of Aldrovandus has the priority; then comes that of Linnæus, which may mislead; then that of Horsfield; then that of Vieillot. We do not see anything objectionable in the name given by Aldrovandus, and therefore we have retained it.

It is not quite clear what Sir R. Heron means by the 'japanned breed' in the passage hereinbefore quoted; but ornithologists generally agree in considering the peacock last described as a distinct species. The figures of Aldrovandus were taken from drawings sent to the pope by the emperor of Japan. Shaw's figure (*Nat. Miscell.*) was engraved from an Indian drawing. Temminck's sketch of the head (*Hist. Nat. des Gallinacés*) was derived from Le Vaillant, who took it from an individual living at the Cape of Good Hope, whither the bird had been sent from Macao. Dr. Horsfield saw it in Java, and Sir Stamford Raffles in Sumatra, from which last country skins were sent to the Parisian Museum by MM. Diard and Duvaucel. From one of these Vieillot's figure (*Gal. des Ois.*) was taken. The living individuals formerly in the Gardens of the Zoological Society of London came from the Birman territory. The beautifully executed wood-cut in 'The Gardens and Menagerie of the Zoological Society' gives as perfect an idea of the species as can be derived from an uncoloured figure. No record of its habits in a wild state appears to have been published.

Meleagris. (Linn.)

The *Meleagris* of the antients was not a turkey, but a guinea-fowl (*Numida* of modern naturalists). Linnaeus however having given this as the generic name for the Turkeys, which were not known to the antients, ornithologists have continued it. Nor is this now of much consequence, certainly not of sufficient importance to change the name; for notwithstanding the confusion and doubt thrown over the subject by the learned discussions of the earlier modern ornithologists, it is generally known and satisfactorily proved that the Turkeys were only known to Europeans after the discovery of America, from which one species has been spread in a domesticated state over the greatest part of the civilized globe.

Generic Character.—*Bill* rather short, strong, curved, convex, vaulted, its base furnished with a naked skin; a fleshy caruncle surmounting the bill of an erectile nature and conical form. *Head* and *neck* surrounded with a wrinkled mammillated skin, hanging loose like a dewlap as far as the upper part of the breast. Hind toe touching the ground.

Two species are known: one, *Meleagris Gallopavo*, the original stock from which the domesticated turkey is derived; the other, *Meleagris ocellata*, a much more beautifully plumaged bird, did not exhibit in the only known specimen any trace of the tuft of hair on the breast. That character therefore is omitted above; but it is not certain that the last-mentioned species is entirely without this tuft, for the plumage of the specimen was damaged.

Meleagris Gallopavo.

Description of a wild Male.—Head small in proportion to the body, covered with a naked bluish skin, continued over the upper half of the neck and uneven with warty elevations, changeable red on the upper portion and whitish below, interspersed with a few scattered black hairs. The flaccid and membranous naked skin, also changeable on the lower part of the neck, extends downwards into large wattles. A wrinkled conical fleshy protuberance, capable of elongation and with a pencil of hairs at the tip, takes its rise from the base of the bill, where the latter joins the front. When this excrescence is elongated under excitement, it covers the bill and depends several inches below it. A tuft of long rigid black hair springs from the lower part of the neck at its junction with the breast, shooting out from among the plumage to the length of nine inches. The base of the feathers of the body, which are long and truncated, consists of a light fuliginous down; this part of the feather is succeeded by a dusky portion, which is again followed by a broad shining metallic band, varying from coppery colour or bronze to violet or purple, according to the play of the light, and the tip is a broad velvety band; but this last is absent in the feathers of the neck and breast. The general plumage presents a glancing metallic lustre, which is however less glossy on the lower part of the back and tail coverts. The wings are concave and rounded, not extending much if at all beyond the base of the tail. Quills 28; primaries blackish banded with white, secondaries whitish banded with blackish, tinged towards the back particularly with brownish-yellow. Tail fifteen inches in length at least, rounded at the extremity, the feathers 18, broad, and capable of expansion and elevation into a fan-[illegible]. The general colour of these feathers is brown mottled with black, crossed by numerous narrow undulating lines of the same. There is a broad black band near the tip, then a short mottled portion, and lastly a broad dingy yellowish band. The bird stands rather high on its robust red legs, the scales of which have blackish margins, and the blunt spurs are about an inch long: the claws are dusky. Bill reddish, but horn-coloured at the tip. Irides dark brown. Length nearly four feet; expanse of wings more than five.

Female wild Turkey.—Irides similar to those of the male. Bill and spurless legs less stout. Head and neck with less of naked skin, being partially covered with dirty grey feathers. Those on the back of the neck have brownish tips, and so produce a longitudinal band there. The short caruncle on the front is incapable of elongation; and though the tuft on the breast is not present in young hens, it is highly developed in the older ones, as may be seen in Mr. Audubon's celebrated plate. Prevailing hue of plumage dusky grey, each feather having a metallic band duller than in the male, then a blackish band, and lastly a greyish fringe. The blackish band is almost obliterated on the neck feathers and under surface. The whole plumage is more sombre than that of the male; there is less white on the primaries, and there are no bands on the secondaries. The colour of the tail is much as it is in the male. Length not exceeding three feet and a quarter.

Young wild Turkey.—The sexes are not easily distinguished till the skin of the head and neck begins to be tinged with red; but a tubercle on the breast of the young males at the approach of the first winter shows where the tuft is to be; during the second year the tuft becomes some three inches long; and during the third the bird is adult. It continues however to grow in dimensions and beauty for several years. The females attain their full size and colouring at the end of four years, when they have the breast tuft, which is not so full as it is in the male, and seldom exceeds the length of four or five inches.

The weight of these birds must either be now greatly diminished or the older writers must have been given to exaggeration, which last is the probable case. From 50 to 60lbs. has been mentioned, and a modern ornithologist of some celebrity, relying on old authorities, goes beyond the latter weight as the maximum, putting however the minimum at 20. The Prince of Musignano states that birds of 30lbs. weight are not uncommon, and that he had ascertained the existence of some which weighed 40lbs. Mr. Audubon gives the average at from 15 to 18lbs., and mentions a single instance, in the market at Louisville, where the weight was 36lbs.

Habits, &c.—The Prince of Musignano (*Continuation of* Wilson's *North American Ornithology*) informs us that the males, usually termed *Gobblers*, associate in parties of from ten to a hundred, and seek their food apart from the females, which either go about singly with their young, at that time about two-thirds grown, or form troops with other females and their families, sometimes to the amount of seventy or eighty. These all avoid the old males, who attack and destroy the young, whenever they can, by reiterated blows on the skull. But all parties travel in the same direction and on foot, unless the dog of the hunter or a river in their line of march compel them to take wing. When about to cross a river, they select the highest eminences, that their flight may be more sure, and in such positions they sometimes stay for a day or more, as if in consultation. The males upon such occasions gobble obstreperously, strutting with extraordinary importance, as if to animate their companions; and the females and young assume much of the pompous air of the males, and spread their tails as they move silently around. Having mounted at length to the tops of the highest trees, the assembled multitude, at the signal note of their leader, wing their way to the opposite shore. The old and fat birds, contrary to what might be expected, cross without difficulty even when the river is a mile in width; but the wings of the young and meagre, and of course those of the weak, frequently fail them before they have completed their passage, when in they drop, and are forced to swim for their lives, which they do cleverly enough, spreading their tails for a support, closing their wings, stretching out their neck, and striking out quickly and strongly with their feet. All do not succeed in such attempts, and the weaker often perish.

The wild turkeys, according to the same interesting author, feed on maize, all sorts of berries, fruits, grasses, and testæ; tadpoles, young frogs, and lizards are occasionally found in their crops. The pecan-nut is a favourite food, and so is the acorn, on which last they fatten rapidly. About the beginning of October, whilst the mast still hangs on the trees, they gather together in flocks, directing their course to the rich bottom lands, and are then seen in great numbers on the Ohio and Mississippi. This is the *turkey-month* of the Indians. When the turkeys have arrived at the land of abundance, they disperse in small promiscuous flocks of every sex and age, devouring all the mast as they advance. Thus they pass the autumn and winter, becoming comparatively familiar after their journeys, and then venturing near plantations and farm-houses. They have been known on these occasions to enter stables and corn-cribs in search of food. Numbers are killed in the winter, and are preserved in a frozen state for distant markets. The beginning of March is the pairing time, for a short time previous to which the females separate from their mates, and shun them, though the latter pertinaciously follow them, gobbling loudly. 'The sexes,' continues the Prince, 'roost apart, but at no great distance, so that when the female utters a call, every male within hearing responds, rolling note after note in the most rapid succession; not as when spreading the tail and strutting near the hen, but in a voice resembling that of the tame turkey when he hears any unusual or frequently repeated noise. Where the turkeys are numerous, the woods, from one end to the other, sometimes for hundreds of miles, resound with this remarkable voice of their wooing, uttered responsively from their roosting places. This is continued for about an hour; and, on the rising of the sun, they silently descend from their perches, and the males begin to strut for the purpose of winning the admiration of their mates. If the call be given from the ground, the males in the vicinity fly towards the individual, and, whether they perceive her or not, erect and spread their tails, throw the head backwards, distend the comb and wattles, strut pompously, and rustle their wings and body-feathers, at the same moment ejecting a puff of air from the lungs. Whilst thus occupied, they occasionally halt to look out for the female, and then resume their strutting and puffing, moving with as much rapidity as the nature of their gait will admit. During this ceremonious approach, the males often encounter each other, and desperate battles ensue, when the conflict is only terminated by the flight or death of the vanquished.' The usual fruits of such victories are reaped by the conqueror, who is followed by one or more females, which roost near him, if not upon the same tree, until they begin to lay, when their habits are altered with the view of saving their eggs, which the male breaks if he can get at them. They are usually from nine to fifteen in number, sometimes twenty, whitish and spotted with brown like those of the domestic bird. The nest consists of a few dried leaves placed on the ground, sometimes on a dry ridge, sometimes in the fallen top of a dead leafy tree, under a thicket of shumach or briars, or by the side of a log.

Mr. Audubon gives a graphic picture of the parental care of the female; and to his interesting work we must refer the reader for this and other accounts of the habits of these birds, and the enemies with which they have to cope. Bartram also has some curious anecdotes on this part of the subject.

This is the *Meleagris occidentalis* of Bartram; *Meleagris fera* of Vieillot; *Gallo d'India*, *Gallinaccio* (male), *Gallina d'India* (female), of the Italians; *Coq d'Inde* and *Dindon*, *Dinde* (female), of the French; *Indianische Hahn* of the Germans; *Wild Turkey* and *Domestic Turkey* of the British and Anglo-Americans.

Geographical Distribution.—The range of the wild turkey appears to extend from the north-western territory of the United States to the Isthmus of Darien: the birds which have been taken for it to the south of the Isthmus were probably Curassows [CRACIDÆ]; and the improbability of its extension beyond the Rocky Mountains, or even so far, is shown not only by the absence of notice of it by the travellers in those parts, but from more positive evidence. The Prince of Musignano relates that when the Mandan Indians visited the city of Washington, not many years ago, they looked upon the turkey as a great curiosity, and prepared the skin of one to carry home for exhibition. The wooded tracts of Arkansas, Louisiana, Tenessee, and Alabama, and the unsettled parts of the states of Ohio, Kentucky, Indiana, and Illinois, form the great nursery of this species; but their domain is daily shrinking before the activity of the settler; and many years will not elapse before the turkey will cease to exist as a wild species. It however still occurs, though probably in no great numbers, in the mountainous parts of the United States, for instance, in the Blue Ridge in Virginia. Fortunate it is that the race has been secured to man in a state of domestication.

Belon was one of the first who considered the bird to be the *Meleagris* of the antients; and this is somewhat extraordinary, because he appears to have been a good scholar, and the bulk of the passages in which the *Meleagris* is mentioned show that it could not have been a turkey. Aldrovandus, Gesner, and others followed in the wake of Belon. Linnæus, though he retains the name *Meleagris*, well knew that the turkey was a native of the new world; for he places its 'habitat' 'in America Septentrionali;' he also knew that it was the parent stock of the domesticated turkey; for he gives short but very good directions for the care of the young, and mentions their favourite food: 'Pulli delectantur Allio, Urtica; a fame et pluvia cavendi.' In well-regulated poultry-yards, curd, chopped onions (the green part), and boiled nettles are among the best kinds of food now in use for turkey chicks, whose very existence depends upon regular feeding and protection from rain. Barrington (1781) is the last writer of any note who supported the theory that the turkey was the *Meleagris* of the antients: it is however but right to remark that, when he wrote, the existence of the large flocks in a wild state in North America was not generally known, though many of the older writers (Lawson and others, for instance) mention them. Pennant in a masterly manner overthrows that theory, upon which we shall not longer detain the reader, the question being now considered as settled.*

The time of the first appearance of the turkey in Europe is more doubtful. The French writers attribute its introduction to the Jesuits somewhat hastily, for there is evidence that turkeys were known in Europe about 1530, if not before that year; whereas it was not before 1534 that Ignatius Loyola, being at Paris, entered into a solemn compact with six of his friends and fellow-students to promote his great object, the foundation of that religious order. [JESUITS.] The probability is that the Spaniards were the first to bring this bird to Europe, whence it has spread over the whole civilised world; but it is not impossible that it may have been brought to England by Cabot, or some of the subsequent expeditions.

In a domesticated state the plumage varies as much or more than it does in the common poultry. White is far from uncommon; buff is more rare. But the most curious variety is that mentioned by M. Temminck, which was in Madame Backer's aviary at the Hague. This bird has a topknot springing from the crown of the head; and a flock of a pale reddish tint, with an ample crest of pure white, were reared by the same lady.

The royal forests of this country would afford ample shelter to these fine birds, and there, with little trouble, they might be kept in a state of nature. They would soon return to their wild habits, even if it should be thought too much trouble to import some of the true wild breed; and a noble addition they would make to the game in such royal preserves as Windsor and the New Forest. Formerly many were thus kept in Richmond Park, and Windsor Forest was much frequented by them.

Meleagris ocellata.—Cuvier first described this beautiful bird from the specimen formerly in Mr. Bullock's museum, and now in that of Paris, for which it was bought at the breaking up of Mr. Bullock's collection, and lost to this country.

The crew of a vessel were cutting wood in the Bay of Honduras, when they saw three individuals, and captured one alive, which was sent to Sir H. Halford, and met with an accident after its arrival in the Thames, and before it reached Sir Henry, which caused its death. Sir Henry presented it to Mr. Bullock, who then exhibited his museum in the Egyptian Hall, Piccadilly, of which it was one of the most distinguished ornaments.

Description.—Size nearly that of the common Turkey, but the tail is not so much developed, nor is it known whether the bird can spread it or not: the probability is that it can. Bill of the same form with that of the com-like turkey, having a caruncle at its base, apparently capable of elongation and contraction like that of the common sort. Head and two-thirds of the neck naked, and, apparently, livid, but without fleshy tubercles on the lower part. There are five or six above each eye, five upon the centre of the crown, and six or seven in a line one above the other at nearly equal distances on the sides of the neck. No trace of a tuft on the breast could be perceived; but the plumage was rather damaged. Feathers rounded at the ends; those of the lower part of the neck, upper part of the back, scapulars, and all the lower part of the body, bronze-green, with two terminal bands, the first black, and the last, or that next to the tip, of a golden bronze hue. The bands on the other parts of the back are the same, but near the tail-coverts they are more vivid, the bronze becoming of a rich blue or emerald green, according to the incidence of the light, whilst the outer band becomes broader and more golden. Red mingles with the tints on the rump, where the plumage almost assumes the brilliant character of that of some Humming-birds, and the bright border is separated from the blue by a band of velvety black. The hidden part of each feather is grey, mottled with black, and indeed upon the tail and upper coverts this grey is drawn, forming bars, one of which, immediately succeeding the blue band, surrounds it, and gives each feather an ocellated appearance. The tail-coverts and lower feathers of the rump are so disposed that there are four rows with these ocellated tips. The tail, consisting of fourteen feathers only, is rounded. Lower parts of the body banded with bronze, black and green, but wanting the lustre of the upper parts. Quills and bastard wing black, edged obliquely with white, which occupies the external margin of the first almost entirely. Outer webs of the secondaries pure white, not showing the bands in the centre when the wings are closed; the uppermost blotched in the centre with black shot with green, which as the feathers shorten extends more over their surface, so as to leave only a white edge. Greater coverts chesnut. Feet and legs lake-red. (Cuvier; Temminck.)

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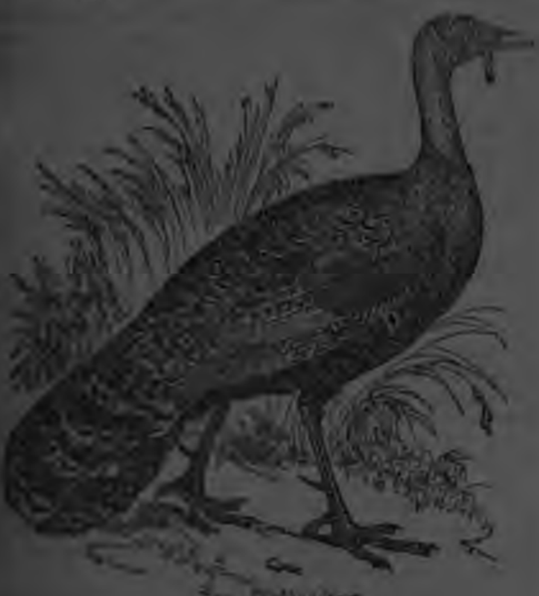
* M. Temminck, in the 4th part of his 'Manuel' just published (1840), quotes M. Cantraine, who states that the inhabitants of Sicily and Dalmatia assert that wild turkeys have been killed in those countries. M. Temminck considers these statements as very doubtful; but allowing them to be true, there would be nothing to prove that the birds alluded to had not escaped from the dominion of man and become wild.



Meleagris ocellata.

Polyplectron. (Temm.)

Generic Character.—*Bill* moderate, slender, straight, compressed, the base covered with feathers, convex above, where it is rather thick; orbits and part of the cheeks naked; *nostrils* lateral, placed towards the middle of the bill, and half closed by a membrane. *Two spurs* on the *tarsi*; *tarsi* long and slender, the hind toe not touching the ground. *Tail* feathers long and rounded, the fifth and sixth longest.

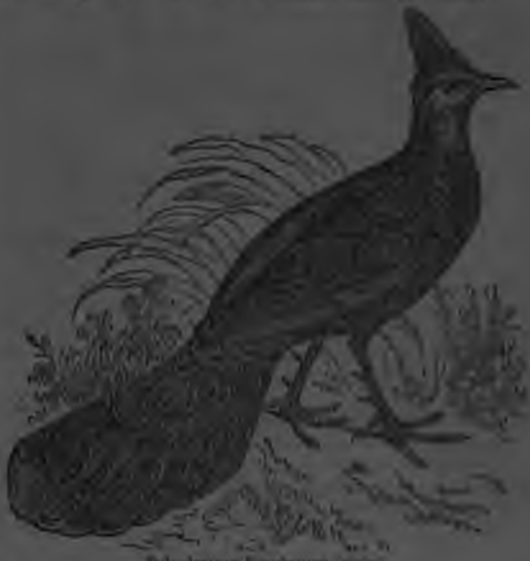
This beautiful form was raised to the rank of a genus by M. Temminck, who established it upon the bird which was named *Pavo Thibetanus* by Brisson, *The Chinese Peacock Pheasant* by Edwards, *Pavo bicalcaratus* by Linnæus, and *L'Eperonnier* by Buffon. Cuvier placed it among the Pavonidæ, properly so called, but other species have been since discovered, which, throwing further light upon the modifications of form, well justify its generic separation. It is the *Diplectron* of Vieillot.

Examples.—*Polyplectron Emphanum*; *Polyplectron Chinquis*; *Polyplectron Chalcurum*.

Polyplectron Emphanum.

Description.—*Male*: Length about 19 inches. Forehead and crown ornamented with a crest of long, narrow, loose feathers, which, together with the plumage of the neck and breast, are rich bluish black with metallic reflections. Above the eyes a large pure white shining stripe, and a patch of the same colour upon the ear-feathers. Back and rump brown, with irregular paler waved bands. Belly and vent deep black. Wing-coverts and secondaries brilliant blue, each feather tipped with velvety black. Tail rather long, much rounded, brown thickly spotted with ochraceous white, and distinguished by large ocellated oval spots of a brilliant metallic green. Towards the end of each feather there is a blackish bar. This beautiful and ample tail is supposed not to be erectile, but to be capable of very wide expansion. This is the *Eperonnier à Toupet* of M. Temminck; *the Crested Polyplectron*.

Locality.—Sunda and the Molucca Isles probably.



Polyplectron Emphanum (male).

Polyplectron Tibetanum.

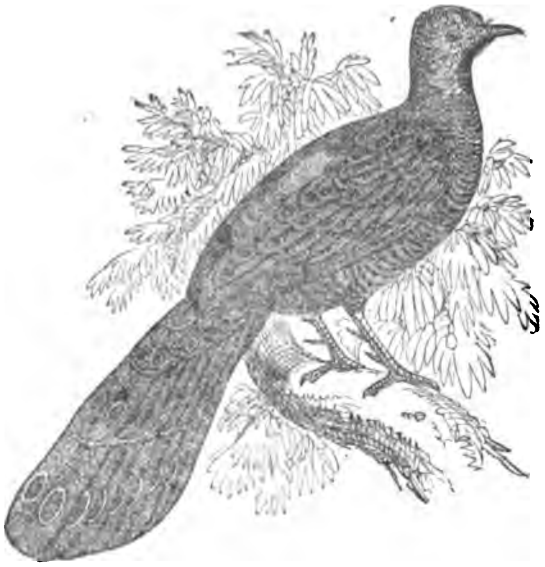
Description.—*Male*: Length about 22 inches. No crest, but the small greyish-brown plumes on the crown of the head are turned forwards, and appear as if ruffled. Head, neck, breast, and belly brown, with transverse waved bands of blackish brown. Throat whitish. Back, rump, and tail-coverts clear brown, spotted and waved transversely with greyish white. Quills brown, marked with greyish; wings, generally, yellowish grey sprinkled with small blackish-brown bands, each feather having at its extremity a large round ocellated brilliant blue spot shot with purple and opaline hues. A circle of deep black, which is, in its turn, set in a ring of yellowish white, surrounds each of these iridescent spots. Tail-feathers dull brown, sprinkled with small ochraceous spots. Upon each of the twenty-two true tail-feathers, at about an inch and a half from the tip, as well as on those of what has been called the upper range at about an inch from the tip, two oval spots with purple and blue reflections with double circles of black and white like those of the wing, but hardly so brilliant, are separated by the shaft only.

Female.—Differing from the male in having the ocellated spots less brilliant, a shorter tail, and no spurs.

Young.—Plumage earthy grey, with large brown spots and bands. At the first moult the plumage becomes more irregular, the spaces upon the wings and tail where the spots are to appear become visible, but they are without lustre, and the pale circle is not present. At the third moult the plumage acquires its full brilliancy. (Temminck, &c.)

This is the *Pavo Tibetanus* of Brisson and Gmelin, the *Chinquis* of Buffon, the *Thibet Peacock* of Latham, the *Peacock Pheasant* of Edwards, and the *Eperonnier Chinquis*, *Polyplectron Chinquis* of Temminck.

Locality.—Supposed to be the mountain-chain which separates Hindustan from Thibet



Thibetian Polyplectron.

In the *Polyplectron Chalcurum* the plumage is comparatively sombre. The ocellated spots on the wings and tail are absent, and the latter, instead of being rounded, has a more elongated pheasant-like form, approaching to that of *Argus.*

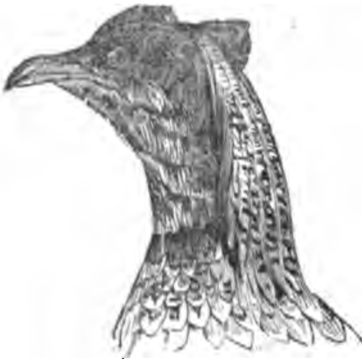
The beautiful birds above briefly noticed, and inhabiting the Indian Islands or China, are described as being almost as hardy as the peacock, and there is little doubt that they might be domesticated in this country. The *Thibetian Polyplectron* is procured for the aviaries of the wealthy Chinese, and M. Temminck's drawing was taken from a bird that had lived for five or six years in an aviary at the Hague.

Mr. Gray (*Illustrations of Indian Zoology*) has figured two other species, *Polyplectron Hardwickii*, nearly allied to *P. bicalcaratum* and *P. lineatum*, which appears to Sir W. Jardine to be the young of some other species; there are, he observes, no spurs on the tarsi. Mr. Gray's figures were taken from General Hardwicke's drawings by native artists.

Argus. (Temm.)

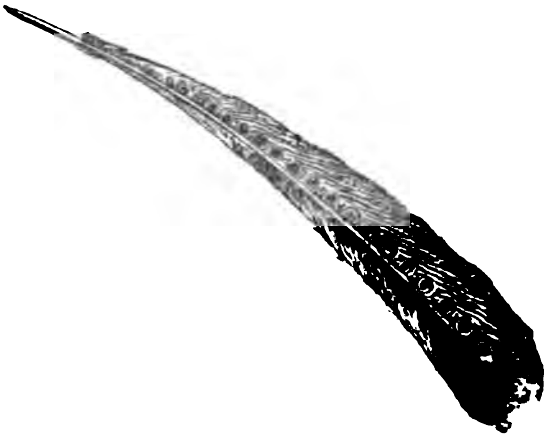
Generic Character.—*Bill* compressed, straight except at the extremity, where it is curved, vaulted, and naked at its base; *nostrils* placed in the middle of the upper mandible, half-closed; head, cheeks, and neck naked. *Tarsi* long, slender, spurless. Two middle *tail*-feathers longest, *secondary quills* much more developed than the primaries.

Example.—The only species known is *Argus giganteus.*



Head of Argus.

Description.—*Adult Male:* In bulk not exceeding an ordinary fowl, but measuring from the tip of the bill to the extremity of the two long tail-feathers five feet three inches, of which length those feathers form three feet eight inches. Throat, upper part of the neck, and cheeks naked or nearly so, there being only a few black hairs dispersed over them. Feathers of the head and back of the neck short and velvety Lower part of the neck, breast, belly, and thighs reddish brown, each feather speckled with dull yellow and black. Upper part of the back and lesser wing-coverts covered with large black spots, separated by a narrow ochraceous line; upper tail coverts clear ochraceous yellow, with brown spots; the longest paler, with spots thicker than on the back, and reddish brown in the centre. Tail deep chesnut sprinkled with white spots, which are encircled with a black ring. The wings, the secondaries of which are three times as long as the primary quills, are painted and ocellated in a manner that defies description. A very faint idea of the pattern of one of these secondaries may be derived from the accompanying cut.



Secondary quil. of Argus giganteus.

Young Males.—Uniform dull brown, spotted and irregularly blotched with reddish yellow, brown, and black. No appearance of the ocellated spots after the first moult and before the second. The shafts of the wing-feathers are black, the quills dull brown, clouded with a line on the inner webs, but the outer show black undulated bands on a brownish yellow ground, and the parts where the ocellated spots are to come are marked with black crescents surrounded with chesnut. After the second moult all the colours are more regularly distributed. After the third their definition is still more exact, but the showy spots are small, irregular in form, and less numerous than in full-grown birds. After the fourth moult the colours acquire their beautiful and elegant harmony, and the markings and spots their full size and complete regularity.

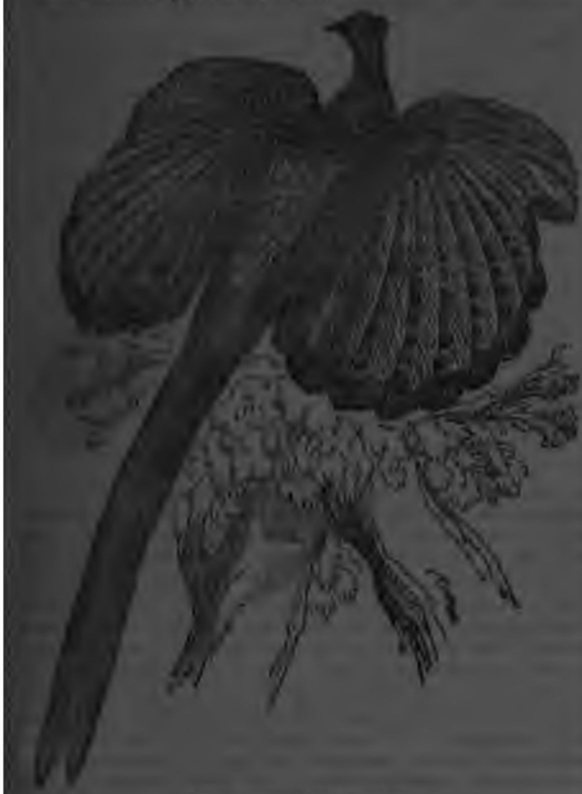
Females.—Head and fore-part of the neck naked; the top of the head is covered with a thick short down, which stretches downwards upon the neck, where it becomes gradually longer, and assumes the form of feathers. The other parts are brownish grey. Lower portion of the neck, breast, and upper parts of the back, chesnut-red; lower part of back, rump, lesser wing-coverts, and tail-coverts have numerous black bands on a yellowish-brown ground. Some of these bands are large, and others narrow and zigzag. No long feathers in the tail, which folds together, forming an angle like that of a common hen, and is brownish chesnut variegated with spots and black bands. The secondaries, which in the male are two feet ten inches in length, are in the female only thirteen inches, narrow, and, with the ocellated spots much less conspicuous, blackish-brown, with small and irregular bands of ochraceous yellow.

This is the *Beautiful Chinese Pheasant* described 'Phil. Trans.,' vol. 55, p. 88; *L'Argus* ou *Luen* of Buffon; *Argus Pheasant*, *Phasianus Argus* of Latham: *L'Argus*, *Argus giganteus* of Temminck.

M. Temminck, from whom the above descriptions are taken, only obtained two females with thirty males. This was most probably owing to the males being the great object of the hunters from their magnificent plumage.

Habits.—The unwieldy size of the secondaries forms an impediment to the bird in its progress through the air, but they assist its pace when running, which it does swiftly with their aid. Its flight, when it does rise on the wing, is heavy and short. When the bird is at rest or unexcited, the beautiful spots on the secondaries are hardly visible; but when showing himself off in the presence of his females, the wings of the Argus are expanded, and trailed upon the ground to display their beauties; and at this time the tail is comparafully spread, and is raised erect; when at rest it is carried in a line with the body, and with the two long feathers folded together. The rest of its habits are not known, but it is said not to thrive well in confinement.

Locality.—Sumatra, and probably other Indian Islands, but principally of Malacca. No proof appears of its having been brought from China and Chinese Tartary, although ornithological writers name those countries as the places of its habitation: the feathers and drawing of the bird described in 'Phil. Trans.' by G. Edwards were sent from Canton to Dr. Fothergill, and are stated to have come from one of the most northern provinces of China.



Argus giganteus; full-grown male.

Lophophorus. (Temm. Monaulus, Vieill.)

Generic Character.—*Bill* strong, long, very much curved, wide at its base, rather thick, convex above, the upper mandible longer than the lower, and overlapping it, large and trenchant at its extremity; *nostrils* half closed by a membrane covered with small scattered plumes. *Tarsus* furnished with a long and sharp spur; hind toe elevated and not touching the ground except at its end. *Tail feathers* fourteen, straight and rounded. Fourth and fifth *quills* longest.

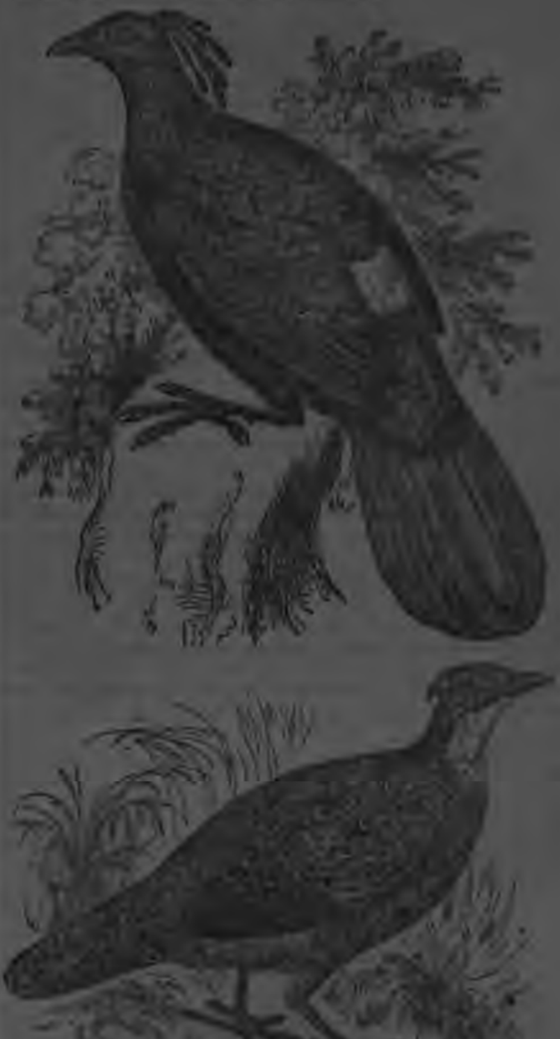
Example, Lophophorus Impeyanus.

Head of Lophophorus Impeyanus. Male.

Description.—*Male*: We must refer our readers to the coloured plates or to the excellent figure in Mr. Gould's *Century of Birds from the Himalaya Mountains*, for anything like an adequate idea of the beauty of its tints; for the greater proportion of the plumage is dazzling with changing hues of green, steel-blue, violet, and golden bronze. The bird looks as if it were principally clothed in a scale-armour of iridescent metal; but the plumage is soft and velvety to the touch. The crest on the head consists of naked-shafted feathers, with an oval or battledore tip of the same quality as the rest of the plumage, and of a metallic green. The centre of the back is pure white. The tail is rounded and bright chesnut. Size of a hen turkey.

Female.—Much smaller. Her plumage is altogether sombre, and without a trace of the splendour which shines forth in the male. The feathers of the head are a little lengthened behind, but not in any degree like the crest of the male. Fore-part of the neck pure white; rest of the plumage reddish-brown variegated and mottled with spots and bars, except a little white at the extremity of the tail-coverts and tips of the tail-feathers.

Young Male.—Much like the female.



Lophophorus Impeyanus, male and female; upper figure, male. (Gould.)

Habits, Food, &c.—The principal food of this species consists of bulbous roots, for scooping out which its bill is well adapted. Nothing certain seems to be known of the rest of its habits.

Locality.—The mountain-ranges of Nepaul and Himalaya. This is the *Lophophorus refulgens* of Temminck; *Impeyan Pheasant, Phasianus Impeyanus* of Latham.

There is little doubt that this noble bird would bear the climate of Great Britain, or that it might be made a splendid addition to our game preserves.

Numida. (Linn.)

Generic Character.—*Bill* short, strong, vaulted, stout, furnished with a warty membrane at the base; from the lower mandible hang two carunculated wattles; head naked or feathered; forehead surmounted with a bony casque or feathered crest; *nostrils* pierced in the cere, and divided by a cartilage. *Tail* short. Fourth *quill* longest.

The birds known to the antients under the name of *Meleagrides*[*] and *Gallinæ Numidicæ* belonged to this genus. They are all natives of Africa, living principally on berries, small slugs, &c. We select as examples *Numida Meleagris* and *Numida cristata*.

Numida Meleagris.—This, the *Gallina di Numidia* of the Italians, *Poulle de la Guinée* and *Peintade Meleagride* of the French, *Pintado* of the Spanish, *Perl Huhn* of the Germans, and *Pearl Hen*, *Guinea Hen*, and common *Guinea Fowl* of the British, is too well known to need description.

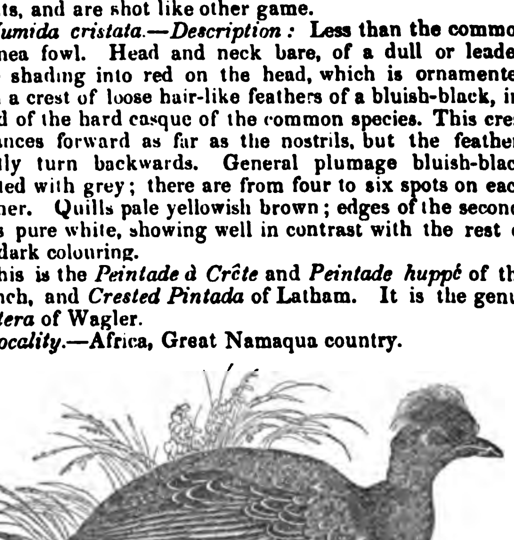
Head of Numida Meleagris.

The bird has been spread very widely, and few poultry yards are without it. In Jamaica, where they do much mischief to some of the crops, they have resumed their wild habits, and are shot like other game.

Numida cristata.—*Description:* Less than the common Guinea fowl. Head and neck bare, of a dull or leaden blue shading into red on the head, which is ornamented with a crest of loose hair-like feathers of a bluish-black, instead of the hard casque of the common species. This crest advances forward as far as the nostrils, but the feathers mostly turn backwards. General plumage bluish-black spotted with grey; there are from four to six spots on each feather. Quills pale yellowish brown; edges of the secondaries pure white, showing well in contrast with the rest of the dark colouring.

This is the *Peintade à Crête* and *Peintade huppé* of the French, and *Crested Pintada* of Latham. It is the genus *Guttera* of Wagler.

Locality.—Africa, Great Namaqua country.



Numida cristata.

Mr. Swainson is of opinion that the *Spotted-winged Pintado* is a distinct species, which he names *Numida maculipennis*.

PAWN. [PLEDGE.]

PAWNBROKERS. All persons who receive goods by way of pawn or pledge for the repayment of money lent thereon at a higher rate of interest than five per cent. per annum, are pawnbrokers. The character of the individual to whom the money is lent is scarcely a subject of consideration with the lender; he may be satisfied, if he believe that the articles pledged are not stolen or come by in an unlawful manner.

Pawning differs from other ways of lending and borrowing money in this: in pawning, the goods of the borrower are delivered to the lender as a security. [PLEDGE.] When the lender has confidence in the integrity and solvency of the borrower, he is often satisfied with a written engagement from the borrower, and if it should be required, with the additional engagement of some other person. When further security is required by the lender, it may be land, or shares in a ship, or it may be something which is not in its nature capable of immediate tradition, as the future benefit to accrue from a policy of insurance; but all these kinds of security are different from that given in pawning, and are treated under the articles MORTGAGE and SHIPS.

The business of lending money on pledges is in many countries carried on under the immediate control of the government as a branch of the public administration; and where only private individuals engage in it, as in this country, it is placed under regulations. Thus in China, where pawnbrokers are very numerous, Mr. Davis says (*Chinese*, vol. ii., p. 438), 'they are under strict regulations, and any one acting without a licence is liable to severe punishment. The usual period allowed for the redemption of the pawned goods is three years. The highest legal rate of interest on deposits is three per cent. per month; but in the winter months the money advanced on wearing apparel may not exceed two per cent., on the alleged ground that poor persons may be able the more easily to redeem.'

The 12 Anne, stat. 2, c. 16, fixes the legal rate of interest at 5 per cent. per annum; but the interest which pawnbrokers are allowed to charge is regulated by a special statute, the 39 and 40 George III., c. 99, passed 28th of July, 1800. This Act fixes the rates of interest allowed on goods or chattels placed in the hands of pawnbrokers according to the following scale:—

For every pledge upon which there shall have been lent any sum not exceeding 2*s*. 6*d*., the sum of ½*d*., for any time during which the said pledge shall remain in pawn not exceeding one calendar month, and the same for every calendar month afterwards, including the current month in which such pledge shall be redeemed, although such month shall not be expired. If there shall have been lent the sum of 5*s*., one penny; 7*s*. 6*d*., one penny halfpenny; 10*s*., two-pence; 12*s*. 6*d*., two-pence halfpenny; 15*s*., three-pence; 17*s*. 6*d*., three-pence halfpenny; 20*s*., four-pence; and so on progressively and in proportion for any sum not exceeding forty shillings; but if exceeding 40*s*. and not exceeding 42*s*., eight-pence; if exceeding 42*s*., and not exceeding 10*l*., after the rate of three-pence for every 20*s*., by the calendar month, including the current month, and so on in proportion for any fractional sum. Parties may redeem goods within seven days after the expiration of the first calendar month without paying interest for the extra seven days; or within fourteen days on paying for one month and a half; after which time interest is charged for two calendar months.

Pawnbrokers are required by the Act to keep books in which all goods taken in pledge must be entered and described, the sum advanced upon them, and the name and abode of the pledger, and whether he is a housekeeper or a lodger. They make out at the time two memoranda of these particulars, one of which is given to the pledger. This duplicate is given gratis in all cases where the sum advanced is under 5*s*.; when it is 5*s*. and under 10*s*., one halfpenny is charged; 10*s*. and under 20*s*., one penny; 20*s*. and under 5*l*., twopence; 5*l*. and upwards, fourpence. Articles pledged for sums above 5*s*. must be entered in the pawnbroker's books within four hours; and those on which 10*s*. or upwards have been advanced must be entered in a separate book and numbered, the first entry in each month commencing No. 1. The number and description of the pledge in the books and on the duplicate correspond with each other. Articles cannot be taken out of pawn without the production of the duplicate, the holder of which is assumed to be the owner. If a duplicate should be lost or stolen, the pawnbroker is required to give a copy of it to the party representing himself as the owner of the article pledged, with a blank form of affidavit, which must be filled up with a statement of the circumstances under which the original duplicate was lost, to the truth of which depothat on oath must be made before a magistrate. For this second duplicate the pawnbroker is entitled to demand one halfpenny, if the sum advanced does not exceed 5s.; from 5s. to 10s., one penny; and afterwards in the same proportion as for the original duplicate.

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[*] Brisson retains the antient appellation for this genus, which stands in his system as *Meleagris*; but the word is so universally used by ornithologists as the generic name for the Turkeys, that it would be productive of confusion to apply it to the Guinea-fowls.

The penalty against unlawfully pawning goods the property of others is between 20s. and 5l., besides the full value of the goods pledged; and in default of payment, the offending party may be committed for three months' imprisonment and hard labour. Persons forging or counterfeiting duplicates, or not being able to give a good account of themselves on offering to pawn goods, are liable to imprisonment for any period not exceeding three months. Pawnbrokers or other persons buying or taking in pledge unfinished goods, linen or apparel entrusted to others to wash or mend, are to forfeit double the sum advanced and to restore the goods. The Act empowers police-officers to search pawnbrokers' houses or warehouses when suspected to contain unfinished goods unlawfully pledged, and goods unlawfully pawned must be restored to the owner by the pawnbroker.

All pawned goods are deemed forfeited at the end of one year. If redeemed, the pawnbroker must endorse on his duplicate the charge for interest, and keep it in his possession for one year. Articles on which sums have been advanced of 10s. and not exceeding 10l., if not redeemed, must be sold by auction, after being exposed to public view and at least two days' notice having been given of the sale. The catalogue of sale must contain the name and abode of the pawnbroker, the month the goods were received, and their number as entered in the books and on the duplicate. Pictures, prints, books, bronzes, statues, busts, carvings in ivory and marble, cameos, intaglios, musical, mathematical, and philosophical instruments, and china, must be sold separate from other goods, on the first Monday in January, April, July, and October in every year. On notice not to sell given in writing, or in the presence of one witness, from persons having goods in pledge, three months further are allowed beyond the year for redemption. An account of sales of pledges above 10s. must be entered in a book kept by the pawnbroker, and if articles are sold for more than the sum for which they were pledged, with interest thereon, the owner is entitled to the overplus, if demanded within three years after the sale. Pawnbrokers' sale books are open to inspection on payment of a fee of one penny. The penalty on pawnbrokers' selling goods before the proper time, or injuring or losing them, and not making compensation to the owner, according to the award of a magistrate, is 10l. They are required to produce their books on the order of a magistrate in any dispute concerning pledges, and are not to purchase goods which are in their custody. The Act extends to the executors of pawnbrokers.

The Act prohibits pledges being taken from persons intoxicated or under twelve years of age. (By the 'Metropolitan Police Act' (2 & 3 Vic., c. 47), a fine of 5l. is inflicted upon pawnbrokers taking pledges from persons under the age of sixteen.) Pawnbrokers are prohibited from buying goods between the hours of 8 A.M. and 7 P.M.; or receiving pledges from Michaelmas-day to Lady-day before 8 A.M. or after 8 P.M.; or for the other part of the year, before 7 A.M. or after 9 P.M., excepting on Saturdays and the evenings preceding Good Friday and Christmas Day, when the hour for closing is extended to 11 P.M. They are required to place a table of profits and charges in a conspicuous part of their place of business.

Pawnbrokers are required to take out an annual licence from the Stamp-Office; and, to enable them to take in pledge articles of gold and silver, a second licence is necessary, which costs 5l. 15s. Those who carry on business within the limits of the old Twopenny Post pay 15l. a year for their licence, and in other parts of Great Britain 7l. 10s. The licence expires on the 31st July, and a penalty of 50l. is incurred if it is not renewed ten days before. No licence is required in Ireland, but those who carry on the business of a pawnbroker must be registered.

From 1833 to the end of 1839, the number of pawnbrokers in the metropolitan district increased from 368 to 386; in the rest of England and Wales, from 1032 to 1194; and in Scotland, from 52 to 88: making a total of 1668 establishments, which pay 15,415l. for their licences, besides the licence which many of them take out as dealers in gold and silver. The increase in the number of pawnbrokers in the course of the above five years is nearly 5 per cent. in London, 15 per cent. for other parts of England and Wales, and nearly 70 per cent. for Scotland. The increase in England is to a considerable extent chiefly in places where the business of a pawnbroker has not hitherto been carried on; and in Scotland, according to the 'New Statistical Account' now publishing, the extent of this innovation is quite remarkable. The business of a pawnbroker was not known in Glasgow until August, 1806, when an itinerant English pawnbroker commenced business in a single room, but decamped at the end of six months; and his place was not supplied until June, 1813, when the first regular office was established in the west of Scotland for receiving goods in pawn. Other individuals soon entered into the business, and the practice of pawning had become so common, that, in 1820, in a season of distress, 2043 heads of families pawned 7380 articles, on which they raised 738l. 5s. 6d. Of these heads of families 1375 had never applied for or received charity of any description; 474 received occasional aid from the Relief Committee; and 194 were paupers. The capital invested in this business in 1840 is about 26,000l. Nine-tenths of the articles pledged are redeemed within the legal period. (Dr. Cleland's 'Former and Present State of Glasgow,' 1840.) There are no means of ascertaining the exact number of pawnbrokers' establishments in the large towns of England. In 1831 the number of males above the age of twenty employed in those at Manchester was 107; at Liverpool, 91; Birmingham, 34; Bristol, 23; Sheffield, 21; but owing to the time which has elapsed since the census and the kind of information which it gives on this matter, we are without such knowledge on this subject as it would be desirable to possess. A return of the amount and nature of the dealings of pawnbrokers would doubtless offer many valuable illustrations of the condition and habits of the people. The only return of the kind which we have seen, was supplied by a large pawnbroking establishment at Glasgow to Dr. Cleland, who read it at the meeting of the British Association for the Advancement of Science in 1836. The list comprised the following articles:—539 men's coats, 355 vests, 288 pairs of trowsers, 84 pairs of stockings, 1980 women's gowns, 540 petticoats, 132 wrappers, 123 duffles, 90 pelisses, 240 silk handkerchiefs, 294 shirts and shifts, 60 hats, 84 bed-ticks, 108 pillows, 252 pairs of blankets, 300 pairs of sheets, 162 bed-covers, 36 table-cloths, 48 umbrellas, 102 Bibles, 204 watches, 216 rings, and 48 Waterloo medals. It was not stated during what period these articles were received. There are in Glasgow above thirty pawnbrokers. In the manufacturing districts during the prevalence of 'strikes,' or in seasons of commercial embarrassment, many hundreds of families pawn the greater part of their wearing-apparel and household furniture. (Paper read in 1837 by Mr. Ashworth, of Bolton, 'On the Preston Strike in 1836.') The borough-reeve of Manchester stated on a recent occasion (April, 1840) that a clergyman had shown him sixty-seven pawn-tickets from one family, and he said there were thousands in similar circumstances 'going inch by inch,' in consequence of the stagnation of industry. The practice of having recourse to the pawnbrokers on such occasions is quite of a different character from the habits of dependence into which many of the working classes suffer themselves to fall, and who, 'on being paid their wages on the Saturday, are in the habit of taking their holiday clothes out of the hands of the pawnbroker to enable them to appear respectably on the Sabbath, and on the Monday following they are again pawned, and a fresh loan obtained to meet the exigencies of their families for the remainder of the week.' (Petition 1131, *Appendix to the 42nd Report on Public Petitions, Session 1839.*) It is on these transactions and on such as arise out of the desire of obtaining some momentary gratification that the pawnbrokers make their large profits. It is stated in one of the Reports on the Poor-Laws that a loan of

3d., if redeemed the same day, pays annual interest at the rate of 5200 per cent.; weekly, 866 per cent.

4d.	„	3900	„	„	650	„
6d.	„	2600	„	„	433	„
9d.	„	1733	„	„	288	„
12d.	„	1300	„	„	216	„

In the petition already quoted, it is stated, that on a capital of 6d. thus employed (in weekly loans) pawnbrokers make in twelve months 2s. 2d.; on 5s. they gain 10s. 4d.; on 10s. they clear 22s. 3½d.; and on 20s., lent in weekly loans of sixpence, they more than double their capital in twenty-seven weeks; and should the goods pawned remain in their hands for the term of twelve months (which seldom occurs), they then derive from 20 to 100 per cent. The 'Loan Fund Societies,' which are protected by an Act of the Legislature, and advance small sums under 15*l.* at 5 per cent., are of no advantage to the habitual dependants upon the pawnbroker.

The 'Pawnbrokers' Gazette' is a stamped weekly publication containing advertisements of sales, and other information of use to the trade, amongst whom it exclusively circulates.

The act for the regulation of pawnbrokers in Ireland is the 28 George III., c. 43 (Irish statute). It requires pawnbrokers to take out licences and to give securities; appoints the marshal of the city of Dublin corporation registrar of licences; directs returns to be made to him monthly, upon oath, of sums lent; and allows the registrar a fee of one shilling on each return. The act requires the returns to be laid before parliament; but this is not done, and a petition was presented to the House of Commons, in 1837, complaining that the statute was evaded by an arrangement made by the registrar with the pawnbrokers not to require any returns from them, upon their paying him 1*l.* yearly. The act is also neglected in other respects, especially in the mode of selling unredeemed pledges. The rate of interest allowed is 25 per cent. per annum. Duplicates are charged one penny for sums under 10*s*; from 10*s*. to 40*s*., twopence; from 40*s*. to 10*l*., fourpence. It is the practice to charge interest for one whole month, though in a great number of cases the article pledged is redeemed in a week. The operation of this plan is shown in the following table:—

	Per week.			Per month.			Per year.		
	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*
One shilling per week, ½*d.* interest, and 1*d.* for the duplicate, is	0	0	1½	0	0	6	0	6	6
One pound lent in shillings pays 10*d.* interest, and 1*s.* 8*d.* for duplicates, is . . .	0	2	6	0	10	0	6	10	0
One hundred pounds lent in shillings pays 4*l.* 3*s.* 4*d.* interest, and 8*l.* 6*s.* 8*d.* duplicates, is	12	10	0	50	0	0	650	0	0

Thus the sum of 100*l.* lent in shilling loans redeemed at the end of a week, at compound interest would amount in one year to 45,690*l.* 7*s.* 0½*d.*

Mr. Barrington, the founder of the Mont de Piété at Limerick, stated in a petition to parliament, in 1837, that there were 700 pawnbrokers in Ireland, whose incomes, averaging 900*l.* each, amounted in the aggregate to 630,000*l.* per annum. (Petition 59, *App. to 2nd Report on Public Petitions, Session* 1837-8.) The pawnbrokers of Ireland, in a counter-petition, asserted that the number of their body did not exceed 440, and that, with the exception of some of those resident in Dublin, Cork, Limerick, and Belfast, their average incomes did not exceed 400*l.* per annum. (Petition 398, *App. to 24th Report on Petitions, Session* 1837-8.) Probably the truth may be found between these contradictory statements. Mr. Barrington was engaged at the time in founding the Limerick Mont de Piété, as a means of providing funds for the public charities of that city. He erected buildings at his own expense, and sent competent persons to Paris to make themselves acquainted with the mode of conducting the Mont de Piété in that capital. A capital of 4000*l.* was raised in debentures bearing interest at 6 per cent.; and the Limerick establishment was opened on the 13th of March, 1837, under the control of a committee, consisting of the two city members, the mayor and chief police magistrates, and the Protestant and Roman Catholic bishops. In the course of eight months 13,000*l.* had been lent on 70,000 pledges at a rate of interest amounting to one farthing per month for a shilling, no charge being made for duplicates. Six-sevenths of the amount advanced was in sums under 5*s*. Four months after the establishment was opened, the value of articles redeemed on Saturdays averaged about 140*l.*, the interest on which amounted to 3*l.* 3*s.* 6*d.*, while the pawnbroker's charge would have been 9*l.* Towards the close of the year 1839, Mr. Barrington published a short pamphlet showing the further progress of the institution. The capital had been increased to 15,350*l.*, and a clear profit of 1736*l.* had been realised since March, 1837. Small sums are lent to poor persons of known respectability of character on their personal security. This plan is attended with valuable effects upon the conduct and character of the poorer classes.

In Appendix E, 'Poor Inquiry (Ireland),' there is an account of the Ahascragh Loan Society, which shows that where individuals can be found to superintend the details, the ruinous plan of applying to pawnbrokers may be partially obviated. This Society had borrowed 720*l.*, partly from the county Galway trustees, which sum had been disposed among 400 borrowers, and no loss had occurred during the two years in which the Society had been in operation, chiefly in consequence of the attention of the Rev. H. Hunt, the treasurer. In the evidence taken at an examination by the Commissioners of Inquiry in the county Leitrim (p. 93) it was stated that there were no pawnbrokers in the barony; but a class of men called usurers are to be met with in every direction, 'and they bind both borrowers and sureties by solemn oaths to punctual repayment of the principal, and of the interest, which is exorbitant in proportion to the smallness of the sum lent.' The witness, who was a magistrate, further stated that a case had recently come before Lord Clements and himself, in which a man had bound himself to pay 12*s.* a year in quarterly instalments for the use of 15*s.* principal. Such facts show the expediency of affording every encouragement to establishments conducted under the immediate control of the law. In some instances in Ireland pawnbrokers keep spirit-shops under the same roof or in an adjoining house. The Report just quoted states that people were beginning to lose their reluctance to wear the forfeited property of their neighbours; and most of the poor persons examined stated that a few years ago they were ashamed to go to the pawnbrokers, but this feeling appeared then to have been much weakened. The scarcity of capital in Ireland occasions many individuals to have recourse to pawnbrokers for purposes unknown in England, such as obtaining the means of purchasing a pig or buying seed.

In some of the British colonies the regulations for pawnbrokers appear to be very imperfect, if not unjust. The following table, showing the sums for which goods were redeemed for a poor woman at Hobart Town, is from the 'Austral-Asiatic Review' of Nov. 12th, 1839:—

Articles.	Amount.		Interest per week.			
Gown ..	3*s.*	0*d.*	3	weeks' interest	0*s.*	9*d.*
Cloak ..	4	0	4	ditto	1	4
Kettle ..	2	6	10	ditto	2	1
Jacket ..	2	0	8	ditto	1	4
Gown ..	3	0	8	ditto	2	0
Principal	14	6	Interest	. .	7	6

The duplicates all contained the following notice:—'This duplicate must be renewed or the pledge redeemed within *six* months from the date hereof, or the article will be *forfeited*.'

The Mont de Piété is an institution of Italian origin. [MONT DE PIETE.] Leo X. (1513-21), or, as some authors say, Pope Paul III. (1534-1549)), sanctioned the establishment of the first of these institutions. It is said however that a Monte di Pieta was founded at Parma in 1458. [PARMA.] One was formed at Amsterdam, 1568; Augsburg, 1 . Brussels, 1691; Antwerp, 1620; Ghent, 1623; Pa 1777. In 1661 a project existed for establishing Mont de Piété in England, and the following is the title of a pamphlet which was printed in London in the above year in connection with this scheme, which however was never carried into effect:—'Observations manifesting the conveniency and commodity of Mount Pieteyes, or Publick Bancks for Relief of the Poor or Others in Distress upon Pawns.' It is extremely doubtful whether a public institution for lending money on pledges would answer in London. Many branch establishments would be necessary, and they would scarcely be so economically conducted as the establishments belonging to private individuals. To give such an institution a monopoly resembling that which the Post-office possesses, would never be thought of in this country. The rates of interest charged by pawnbrokers are high; but the average profits of their trade are not so inordinate as might be inferred from a hasty glance at the preceding tables, which nevertheless fully prove, that having recourse to pawnbrokers is an improvident mode of raising money. In 1838 a company was formed in London called the 'British Pledge Society,' which proposed lending money at one-half the rate of interest allowed by the 39 and 40 George III., c. 99, and without making any charge for duplicates. This society also pledged itself to make good losses in case of fire, for which usually pawnbrokers are not liable. The Bill of incorporation, after being read a first time in the House of Commons, was abandoned.

There is a Mont de Piété at Moscow on a very extensive scale, the profits of which support a foundling hospital. They are numerous in Belgium. From a paper read by Rawson W. Rawson before the London Statistical Society in 1837, the following appear to be the terms of the Mont de Piété of Paris:—'Loans are made upon the deposit of such goods as can be preserved to the amount of two-thirds of their estimated value; but on gold and silver, four-fifths of their value is advanced. The present rate of interest is 1 per cent. per month, or 12 per cent. per annum. The Paris establishment has generally from 600,000 to 650,000 articles in its possession, and the capital constantly outstanding may be estimated at about 300,000*l*. The expense of management amounts to between 50 c. and 65 c. on each article, and the profits are wholly derived from loans of 5 francs and upwards. Articles not redeemed within the year are sold, subject however, as in England, to a claim for restitution of the surplus, if made within three years.'

The statistical tables published by the French minister of commerce show the operations of the Mont de Piété of Paris and those of the large towns in France during the year 1833; and the following brief analysis of them may be useful, if it be desired to estimate the extent of similar transactions in the private pawnbroking establishments in the United Kingdom: in the absence of actual facts, it at least offers points for consideration. The number of articles pledged in Paris in 1833 was 1,064,068; average sum advanced on each, 14*s.* 11*d.* It is necessary to observe that, from the low rate of interest and the confidence inspired by an establishment under the immediate control of the government, the Mont de Piété is made use of by persons of a higher class than those who apply to pawnbrokers in this country. The number of articles redeemed was 849,861; on 172,915 articles the interest was paid and the duplicate renewed; 50,636 articles, on which the sum of 39,291*l.* had been advanced, were forfeited, being one-twentieth in number, but less than one-twentieth in value. At Metz, in the same year, the forfeited pledges were one in 13; at Strasbourg, one in 19; at Lyon, one in 20; at Marseille they formed the smallest proportion, being only one in 29. In eleven of the largest towns of France, including the above four, 731,086 articles were taken in pledge; but the sum advanced on each, being 9*s.* 2½*d.*, was not much more than half the value of those pledged in Paris. The average sum varied considerably, being as low as 4*s.* 10*d.* at Strasbourg, and as high as 17*s.* 1*d.* at Marseille. In Brest, Nîmes, Dijon, and Nantes, the average value of each of the unredeemed articles *exceeded* the average value of each of the total number of articles pledged.

PAX, an ecclesiastical instrument of ancient use in the Roman Catholic church. St. Paul, in several of his epistles, commands the professors of the Christian religion to 'salute each other with a holy kiss.' That this was literally practised in the first ages of the church, we learn from the apostolical constitutions, together with some particulars respecting the method of performing this ceremony. 'Let the bishop salute the church, and say, *The peace of God be with you all*: and let the people answer, *And with thy spirit*. Then let the deacon say to all, *Salute one another with a holy kiss*, and let the clergy kiss the bishop, and the laymen the laymen, and the women the women.' (Li. viii., c. 11, apud Cotelier, p. 345.)

The custom of giving the kiss of peace before the communion, in the more solemn service of the Roman Catholic church called the High Mass, is still kept up among the officiating clergy, as well as among the men and women of the different religious orders. So also it appears to have been practised by the laity during the whole of the middle ages, while the men and women were separated from each other. But when the sexes began to be mixed together in the less solemn service called the Low Mass, which began to take place in the twelfth or thirteenth century, a sense of decorum dictated to the bishops the use of an instrument called sometimes a *Pax*, sometimes *Tabula Pacis*, and sometimes *Osculatorium*, which the priest kissed first, then the clerk, and lastly the people who assisted at the service, one after another, instead of the former kiss.

Among the constitutions of Walter de Grey, archbishop of York, A.D. 1250, an *osculatorium* was one of the regular ecclesiastical ornaments, or rather implements, ordered to be provided in every parish church.

It was usually in the form of a metallic plate or tablet, with a support at the back, and had a representation of the crucifixion in front, either in relief or engraved. The magnificent pax of silver, engraved in niello, by Finiguerra, is still preserved at Florence.

The general disuse of this plate in modern times is attributed by Le Brun (*Explication Littérale, &c. de la Messe*, tom. i., p. 595) to certain jealousies which were found to arise among individuals, about priority in having it presented to them.

The use of the Pax was not among the ceremonies which were first abrogated at the Reformation in England: on the contrary, it was enforced by the ecclesiastical commissioners of Edward VI., and rendered more ostensible than it had been, as appears by the following injunction, published in the deanery of Doncaster, in 1548:—'The clerk shall bring down the paxe, and standing without the church-door, shall say loudly to the people these words: "This is the token of joyful peace, which is between God and man's conscience,"' &c.

(Du Cange, *Gloss.*, v. 'Osculatorium,' 'Osculum Pacis,' 'Pax;' Milner, 'On the Use of the Pax,' *Archæolog.*, vol. xx., p. 534; Burnet, *Hist. Reform.*, vol. ii., collect. P. ii., No. 21.)

PAXO, the smallest of the Ionian Islands, lies south-south-east of Corfu, being eight miles from Capo Bianco, the southernmost point of that island, and about ten miles west of the nearest point of the mainland of Epirus. Paxo is rocky, and is chiefly planted with olive-trees which produce the best oil in the Ionian Islands. The island is destitute of spring-water, and is deficient in corn and other necessaries, which are brought in from Corfu and other places. Its surface is reckoned at 26 square miles, and the population by the census of 1834 was 5284 inhabitants. The principal village in the island, called Porto Gai, has a good harbour, and is the residence of the authorities. Two other hamlets, Loca and Longos, lie also by the sea-coast. The small island called Anti-Paxo, three miles south-east of Paxo, is about three miles in circumference, and is inhabited by fishermen and a few shepherds. (Neigebaur, *Ionische Inseln.*) [IONIAN ISLANDS.]

PAZ, LA, a town in Bolivia, situated near 16° 30′ S. lat. and 68° W. long. It stands in a ravine probably more than 1000 feet below the table-land of the lake of Titicaca [BOLIVIA], on some hills which are scattered over the ravine, on the northern side of which rises the elevated peak of Illimani. The ravine and town are intersected by a river, the Chuquiapo, which breaks by a narrow gorge through the eastern chain of the Bolivian Andes, and is one of the remotest sources of the Rio Madeira. The ravine is enclosed by high and steep mountains, and contains little level ground; but it is cultivated with great care wherever cultivation is practicable. The streets of the town are very irregular, and some of them extremely steep. It contains many extensive dwelling-houses, built in the Spanish fashion; but the roofs are not flat, and they are covered with tiles on account of the snow, which, during the winter, falls in this ravine. The greater part of the houses however are only mud-huts, and inhabited by Indians. La Paz is the most commercial town in Bolivia. All the merchandise designed for the consumption of Chuquisaca, Potosi, and Cochabamba, is conveyed to this place from the coast of Peru, and hence carried into the interior. The surrounding country produces no article of export except gold and bark, which are collected in considerable quantity on the eastern declivity of the eastern range of the Bolivian Andes. The population exceeds 20,000.

(Temple's *Travels in various parts of Peru*; Pentland, in *London Geog. Journal*, vol. v.)

PEA. The garden pea (*Pisum sativum*) is a native of the south of Europe, but sufficiently hardy in a young state, or when its development is not much extended, to bear our winters when they are moderate, and when the plants have, as in gardens generally, a sheltered situation.

The pea, together with the bean and kidney bean, are enumerated as the legumes cultivated by the Romans; and these indeed comprise the principal species of leguminous plants in the kitchen-gardens of Britain at the present day. Among these the pea ranks first in importance and general usefulness. It had probably been introduced into this country at an early period, for peas are mentioned by Lydgate, a poet of the time of Henry VI., as being hawked in London. It appears however that for at least a century afterwards, in Queen Elizabeth's time, they were either not very common, or the manner of obtaining them early was unknown, for Fuller states that in the last-mentioned reign peas were brought from Holland, and were accounted 'fit dainties for ladies, they came so far and cost so dear.'

The varieties of the pea are numerous. The best account of them will be found in the 'Transactions of the Horticultural Society,' 2nd series, vol. i., where 43 varieties, comprising no fewer than 175 synonyms, are arranged and described.

The following is a selection of the more useful varieties:—

For early sowing—Early Dwarf.
Early Frame.
Early Charlton.
D'Auvergne, a particularly excellent sort.
For the principal summer crop—
Blue Prussian.
White Prussian.
Groom's Superb Dwarf Blue.
Dwarf Green Marrow.
Knight's Dwarf Marrow.
For late sowing—Knight's Tall Marrow.

There are some varieties of peas destitute, or nearly so, of the internal tough lining of the pods; these are called *sugar peas*, and their pods are eaten cooked in the manner of kidney beans. The best variety of this class is the Large Crooked Sugar, which will likewise be found a very good sort for use in the ordinary way.

The soil for peas ought to be fresh and well stirred, but not too rich; for in the latter case a luxuriant growth is induced without fertility.

The times of sowing are, in November for the earliest crop, and at intervals of a month, three weeks, or a fortnight, as the season advances, till Midsummer. The produce from any that may be sown after this period is very uncertain; as is indeed the case with the November and other sowings previous to those of spring. The shelter afforded the young plants in winter by spruce branches or temporary awnings is of course beneficial. Various plans have been suggested for forwarding peas under glass, so as to transplant in the end of February or in March into the open ground. The best mode is to sow in small pots, and at the proper season to turn out the plants with the ball of earth and roots as entire as possible, to plunge them at short intervals in rows, and to shelter them by sticks of a branching nature and fan form.

The distance which should be allotted for the intervals between the rows of peas may be three, four, five, or six feet, according to the growth of the sort and richness of the soil. The plants should not be allowed to grow too thick in the rows, otherwise they are drawn up slender, without a due proportion of foliage on the lower part of the stem, which, in that case, as well as the leaves depending on it, is apt to become unhealthy and to mildew.

Agricultural Cultivation.—The common pea is a vegetable too well known to require description. It is cultivated in the garden and in the field, and there are several varieties of it. The plant is naturally a creeper, having numerous tendrils, by which it lays hold of stronger plants and supports itself. The pods contain one row of round seeds, which at first are soft and juicy, in which state they are used for the table under the name of green peas. They afterwards harden and become farinaceous, and the stem dries up. In this state they are thrashed and stored for use like corn, and serve chiefly to fatten hogs. The straw is given to cattle and sheep in winter.

There are some varieties of peas the stems of which do not rise or creep, but remain short, and hence are called dwarf peas. These are preferred for early sowing in the garden, and likewise when they are cultivated in the fields to be gathered in a green state. Every gardener strives to raise early peas, and the first which are brought to the London market are sold for a very great price. As soon as they are more common, such quantities are sometimes raised in the fields, that the price scarcely defrays the expense of gathering and bringing to market. When the market is not overstocked, this crop is very profitable, as it does not exhaust the land, and there is good time for a crop of tares or turnips after the peas in the same season. But the usual purpose for which peas are cultivated in the regular course of husbandry, is to fatten hogs. A white sort, which readily splits when subjected to the action of millstones set wide apart so as not to grind them, is used in considerable quantities for soups, and especially for sea-stores. There is also a blue sort which answers the same purpose. The hog pea is of a grey or dun colour.

Peas contain much farinaceous and saccharine matter, and are therefore highly nutritious; no other seed surpasses them in this quality, except the seed of the French bean (Phaseolus). But this is refused by most animals in the raw state, owing to a certain toughness, which makes them adhere to the teeth; and, even when boiled, they are not relished by them.

As food for hard-working men, peas are excellent when well boiled and mixed with some animal fat, or the liquor in which bones have been long and slowly boiled to extract the gelatine. In some countries peas-meal is baked into hard cakes, with or without oatmeal or barley-meal. These cakes are nutritious, but are of difficult digestion, except where custom and hard labour have inured the stomach to their use.

The soil best suited to the growth of peas is a light or sandy loam of some depth, and in good heart: the usual preparation of it is by repeated deep ploughings and pulverising with harrows or other instruments. It is not adviseable to manure the land immediately for peas, as it makes them throw out abundant stems at the expense of the produce in pods. They follow well after barley in which no clover has been sown, and are a good substitute for clover where there would be a danger from the too frequent repetition of clover on the same land. When clover has failed, peas supply its place, the ground being ploughed up before winter, or early in spring, and well pulverised. The wheat is not always so good after peas as after clover, when the clover is a good crop; but it is well known that if the clover fails, the wheat will also suffer. It is therefore better to have peas, than to risk sowing wheat after a thin crop of clover. If the peas are not well hoed, and do not cover the surface, the land will be full of weeds; but with good management it may be looked upon as a cleansing crop. Many farmers consider peas as a very uncertain crop; but they are only so when the land is carelessly cultivated. They are, no doubt, often injured by want of moisture in the soil, or by an excess of it; but deep ploughing will prevent the former, and careful draining the latter. If peas are sown on land which is exhausted, or naturally very poor, no certain crop can be relied on. It sometimes happens however that an excellent crop is obtained against all probability, considering the state and tillage of the land, owing to some fortunate coincidences of favourable weather, and in this case it would appear as if great care in the preparation of the soil were unnecessary, but this is not often the case, and no prudent farmer will trust to the chances, which are much against success. In nine cases out of ten a slovenly cultivation or an improper succession of crops is the cause of great disappointment and loss, and it may be laid down as a general rule, that no good farmer will trust to accident, when by a little care and attention and a reasonable expenditure he may almost ensure success.

Peas must not be repeated on the same land in less than 10 or 12 years, nor are they to be recommended on very stiff clays, on which beans are to be preferred. Wherever beans suit the soil, they are a much better preparation for wheat than peas, admitting of much more frequent and perfect hoeing, besides the application of an abundant coat of dung, of which the wheat reaps the benefit as well as the beans.

Peas should be sown as early as the ground will admit of being worked; and in very mild winters January is a very good time for sowing peas, which are intended to be gathered green, in a sheltered situation sloping towards the south-west. The hog peas may be sown in February or March; and if they are horse-hoed, and the earth is raised against the young plants, they will not suffer from a moderate frost. When peas are drilled at 2 feet or more between the rows, it will not take above two bushels to drill an acre. The old method of sowing peas broadcast and ploughing them in is now seldom practised, and to sow them and harrow them in is nowhere recommended; the birds in this case having much too great a share of the seed. When peas follow clover, the practice of dibbling them into the sward, which has been turned over with the plough, is much to be preferred. Wherever dibbling is generally practised, and there are sufficient hands to put the seed into the ground at a reasonable time, it should be preferred for every kind of crop that can admit of the hoe in the intervals.

When peas are sown later than usual, it is useful to steep the seed a few hours, in order that it may vegetate sooner. A week may often be gained in the coming up of the crop by this means.

The Everlasting Pea, which is so well known in our gardens, has been recommended to be cultivated in the fields for green fodder for horses, which are said to eat it readily. In land which has been well manured, it will produce a very great weight of green food; and there are probably varieties of it more succulent and sweeter than others. If it could be established in a field, it would produce abundant food for several years in succession, without any other cultivation than hoeing out the weeds and stirring the soil around the plants. The seed should be sown in rows, and the plants thinned out by the hoe, so as to stand a foot or 15 inches apart; they would then have room to grow out, and would cover the ground completely. By transplanting year-old plants, a still greater crop might be obtained. It is at least worth a trial.

Peas should be drilled in rows at such a distance as to admit the horse-hoe between them. They should be horse-hoed repeatedly until the stems are so long as to fall down and cover the intervals: a slight earthing of the rows with a plough has the effect of keeping the stems from the ground and allowing the air to circulate under them, by which the podding is much encouraged; for in wet seasons the stems are apt to lie on the wet ground and to rot. When the seed is ripe in the pods on the lower part of the stalks, the crop should be reaped, or many of the pods will burst, and the seed be lost. The reaping is performed by pulling the stems from the root by hand, or by means of two reaping-hooks, which partly tear up the stems, and partly cut them off. They are then gathered into small loose heaps, and left to dry. After being turned over till they are quite dry, they are carted to the stack or barn. Unless the quantity be considerable, so as to make a large stack, it is advisable to put them in a barn, because they are generally thrashed out soon after harvest, when the hogs, having run for a time in the stubbles, are put up to fatten. When the peas are stacked, many of the pods are necessarily exposed to the depredation of birds; and, if they escape this, they burst, and the seed is lost.

The produce of an acre of good peas is from 30 to 40 bushels, and the price somewhat higher than that of beans. They are consequently a profitable crop, and will well repay a little attention in the cultivation. If the land is not in sufficient order and heart to make it advisable to sow wheat after the peas, barley or oats may be advantageously substituted. If the peas fail, it may be necessary to clean the land with a fallow crop before any other corn is sown, for a bad crop of peas invariably leaves the land foul.

The straw or halm of peas, when well harvested, makes excellent fodder for cattle, and especially for sheep, which are very fond of the dry pods when the seeds have been thrashed out.

In some places they sow peas and beans together broadcast, and plough them in; the beans serve as a support to the peas, and a greater return is expected; but unless it be for the purpose of cutting them up for green fodder, as soon as the pods are formed, this practice is not to be recommended. In Flanders, peas, beans, tares, and barley are sometimes sown thick together, and form an abundant green crop, which is cut as soon as the flower is past, and given to the cows and pigs, which thrive well on this succulent food. The surface of the ground is so completely shaded, that no weeds can spring up; and as there has been no seed formed, little is taken from the soil. The land is immediately ploughed up and sown with another crop, such as potatoes or turnips, which sometimes are off the ground in time to allow wheat to be sown the same year.

PEACE RIVER. [North-Western Territory.]

PEACE OF RYSWICK. [Ryswick, Peace of.]

PEACH. The peach-tree (*Amygdalus Persica*, or *Persica vulgaris*) is generally considered to be more especially a native of Persia. It was known to the Romans, and brought to Italy, where it became distinguished by the name of *Persica*; and this name it still retains under various modifications in the different countries of Europe; thus, *peach* is evidently derived from *pêche* or *pêcher*, the latter being formerly written *pescher* by the French. But the peach is not indigenous solely in Persia, for it has been found growing wild in various parts of Turkey in Asia. Pallas describes it as existing in the more southern parts of the Caucasus. From the frequency of its occurrence in a wild state and the perfection which it attains under the most limited share of cultivation in regions situated between 30° and 40° of latitude, these parallels may be presumed to include its favourite habitat. Isothermal lines describe however a wavy track; and the peach may even find a congenial climate in a considerable extent on both sides of the above limits; but the locality must be very peculiarly circumstanced in which it will acquire full perfection beyond the 48th parallel on the one hand; and, on the other, its deciduous nature, requiring a fixed season of rest, unfits it for the continued high temperature of a tropical climate.

It is to be regretted that there are as yet no perfect registers of the temperature of places where the peach in its natural state attains the greatest perfection. Such would at once form the surest guide for the establishment of principles for the regulation of that artificial climate which the tree requires to ensure its fruiting in perfection in Britain, and for which purpose the aids of glass and fire-heat are provided.

The peach withstands our winters unhurt, if they are not unusually severe. It even succeeds in America exceedingly well as a standard, in latitudes where the winters are much more intense, but the summers hotter, than with us. This is in conformity with the well ascertained fact, that all deciduous trees suffer less from severe frost in winter when their wood is perfectly matured by sufficiently warm summers, than when grown in climates where they cannot enjoy that degree of summer heat which they are naturally adapted for, and which they require for the due formation of their tissues. Hence, in the north of England, young peach-trees in the open ground will be partially injured by a degree of frost which, though of equal intensity, will not injuriously affect similar plants in the neighbourhood of London. The peach also succeeds as a standard in Italy, the south of France, and other continental countries of Europe having summers equally hot; but it may be observed that where the mean temperature of the summer months is above 70°, or that of the warmest month above 75°, as is the case at Rome, and still higher at New York, the *melting* varieties of the peach do not possess that rich succulence which they acquire against a south wall under the more moderate summer heats of the climates of London or Paris. On the contrary however, the *firm-fleshed* or *clingstone* peaches, which are little esteemed in this country, are preferred in America and other places subject to extreme summer heat.

If the mean temperature of February amount to 40°, and that of March to 44° or 45°, the peach-tree will be in full flower against a wall with a south aspect about the last week in March; and the general crop will be ripe in the last week of August or first week of September, provided the mean temperature of April be 49°, May 55°, June 61°, July 64°, and that of August 63°. This period of *five* months required for the maturation of the fruit from the time of flowering, on the open wall, may be reduced to *four* by means of fire-heat and the protection of glass; but it cannot be advantageously diminished any further. This fact being borne in mind, it is easy for the gardener to know at what time to commence forcing his peaches in order to obtain a crop in a given month.

From the natural climate and habit of the peach-tree, it is obvious that when forced it must be flowered under a comparatively low degree of temperature. It cannot therefore be well forced simultaneously with the vine, for the temperature of March, which in that climate serves to bring the peach into flower, does not unfold the buds of the vine, this being only effected a month or six weeks farther in the season by a mean temperature of 55°. The peach may be subjected at first to a temperature of 45°, but not exceeding 55° till the flowering is over, after which it may be gradually raised to 60°, and not exceeding 65°, till the substance of the stone is indurated, after which from 65° to 70° may be allowed. This is to be understood as referring to the application of fire-heat. Even in the total absence of the latter, sun-heat will frequently raise the temperature much higher; but in this case a large portion of air should be supplied, not however all at once after the temperature of the house is found too high, but gradually as the temperature increases. Air should be always freely admitted through the day when the weather is at all favourable.

Light is so essential, that unless peaches be trained near the glass, the fruit will neither acquire due colour nor flavour. Vicissitudes of dryness and moisture must be avoided. The roots should be well supplied with water before the fruit begins to ripen off, because at a later period none can be applied without deteriorating the flavour.

The management of the peach-tree can only be correctly understood by those who are aware of the disposition of its buds and its mode of bearing. The leaves on the shoots of the current season are produced either singly, in pairs, or in threes from the same node. In the course of the summer, or early part of autumn, a bud is formed in the axil of every individual leaf, and these are termed single, double, or triple *eyes*, or buds, according as one or more are produced at each node. In the following season, these buds develop themselves either as flower-buds or young shoots, and previously to pruning it is necessary to distinguish the one description from the other. The flower-buds are plump and roundish; the wood-buds are more oblong and pointed, and one of these is generally situated between flower-buds in the case of triple buds occurring at the same node. It is therefore expedient in pruning to shorten a shoot to these triple eyes if possible, or in their absence to a leaf-bud, but never to a fruit-bud only, for no shoot could be prolonged from it, nor would the fruit attain perfection, owing to the want of leaves in immediate connection with its footstalk. In selecting buds for the purpose of propagation, *single* wood-buds only should be chosen.

The mode of bearing is solely on shoots of the preceding summer's growth.

The peach is propagated exclusively by budding; rarely on the peach stock, but frequently on the almond, especially in France. In this country however it is propagated almost entirely on the plum stock, which is not only much hardier, but also possesses the property of spreading its roots nearer the surface than either of the two preceding kinds; thereby affording to the peach a more congenial nourishment in consequence of the roots being within the influence of the solar heat. Whereas the peach stock tends to strike downwards strong tap-like roots beyond the depth of the stratum warmed by the summer-heat; and although the latter trees grow vigorously for a few years, or so long as the roots have not penetrated too deep, yet they afterwards become sickly, their foliage becomes narrow, and acquires a yellowish colour, and the trees ultimately perish. The *muscle* and *white pear-plum* are the varieties of plum stocks on which the peach is budded; the latter is esteemed the best. The French prefer the St. Julien plum stock, which answers exceedingly well.

The peach succeeds in any rich fresh loamy soil; but the subsoil, like that for all fruit-trees, ought not to be retentive, and a very complete mode of drainage is absolutely necessary. It would also be desirable that the roots should not be allowed to penetrate deeper than two feet from the surface. No objections could be made against the roots following their natural tendency downwards to whatever distance they might go, if their extremities were at the same time in a medium congenial to the peach as regards temperature; but this cannot be the case in Britain, unless perhaps some chalk subsoils may form exceptions. It is known by experience, that when the roots are in a medium of much lower temperature than the mean of that of the atmosphere during the growing period, the trees do not thrive, nor does the fruit, under such circumstances, acquire flavour; mildew makes its appearance, and no application will effectually cure it without inflicting a material injury on the foliage. The best remedy for mildew is to take up the tree carefully in autumn, renew the soil, and replant the tree, spreading the roots near the surface. When peach trees are young, they generally grow very luxuriantly; and if dung be abundantly incorporated with the soil, disease is almost certain to manifest itself by the exudation of gum. It is therefore adviseable to defer the application of manure till the trees begin to bear fruit, and then to apply it only as a top-dressing, so as to maintain a vigorous but not an over-luxuriant state of growth, and to retain the new roots near the warm surface of the soil.

Various modes of training the peach have been adopted, h different degrees of success. That of course has proved best which admits of the most equal distribution of sap throughout the respective branches, and likewise the production of a sufficient number of well-placed shoots for replacing those that have once borne fruit, the shoots being only useful for such purpose in the season immediately following that in which they are produced. The fan method, and a modification of it called Seymour's training, are most in conformity with the above principles. A common error in the fan method is that of disposing a few of the first produced branches so as to represent equi-distant radii; the consequences of such disposition are an excessive degree of vigour in the central and most upright, but at the same time those inclining horizontally become comparatively weak, linger for a few years, and then die off. Their share of the sap is soon appropriated by the more vertical branches, some of which will assume the character of stems, and prove unsuitable for producing fruit-bearing shoots. Cutting these back is frequently the only alternative in order to obtain other shoots for the purpose of furnishing the lower part of the wall. By this misdirection of the energies of the tree, several years' growth is wasted, and when it becomes necessary to cut out such large branches, the tree receives a shock which renders it incapable of bearing such fine fruit as a more skilful management will ensure. It may be briefly affirmed that all methods of training are bad which admit upright shoots to compete with horizontal ones; for the former will grow with a vigour ten times greater, in many instances, than the latter, owing to the strong vertical tendency of the sap. Although the ascendency gained by a vertical shoot over a horizontal one is considerable in the current season of their production, yet it bears but a trifling ratio to that which would be gained in successive seasons, were the vertical portion allowed to proceed without interference from the pruning-knife. If however a central vertical shoot be annually trained, and uniformly cut at the winter pruning to within a few buds from its base, no material injury would then result to the side branches, the vertical tendency against them being thus limited to a single summer-shoot. This principle is the basis of the following mode of training.

In cutting back the central shoot, two buds, well situated for producing side branches, and a third for an upright, must be left. The first production of side branches, which are intended to produce the lower radii of the fan, must be trained at some elevation in the first instance, and afterwards brought to a horizontal position; and they should not be subdivided. Those however obtained in the following season may be allowed to form two each, if sufficiently vigorous, at some distance from their base, and as the divergence affords room. The branches produced after these last mentioned, and indeed all the upper ones, may be subdivided into two, or even three. By this method of training the lower branches become strong, and acquire a well established communication with the roots before the upper are in existence, so that there is little danger of their dying off, as usually happens when horizontal and vertical branches are started at the same time.

By repeating the process here detailed, all the principal branches are ultimately produced, to the number of between thirty and forty, and disposed in a fan-like form, diverging not exactly from a common centre, but from a short axis. These branches support the shoots on which, during the second season of their existence, the fruit is borne. Buds for the origin of these shoots should be selected at the distance of every twelve or fourteen inches along the upper side of the branches, that being the side from which they are obtained with the greatest facility, owing to the upward tendency of the sap. As these shoots are being prolonged during the summer, they should be trained so that the foliage may have the fullest exposure to light; but although the foliage of one shoot ought not to overshade that of others, yet the naked branches are benefited by the shade of leaves, for old bark exposed to the direct rays of the sun is apt to be scorched.

The shoots produced and trained during the summer as successional bearing ones, must be shortened considerably at the ensuing winter's pruning, and care must be taken not to cut above a node where there is only a blossom-bud or buds, but to one that is seen to have a wood bud, that such as a shoot will proceed from. In the following spring the blossom-buds are unfolded, and soon after the wood-buds begin to push the rudiments of shoots, one of which next the base of each fruit-bearing shoot, must be preserved and encouraged with special care, in order to supply the place of those that are bearing fruit. The fruit-bearing shoots being useless for such purpose a second time, must therefore be cut away at the following winter pruning, when the young shoot, retained during the summer, is shortened like its predecessor, and trained for the purpose of bearing fruit and producing a successor, which likewise becomes subject to the same routine treatment.

The preceding directions are to be followed in order to the essential pruning, the development and maintenance of the form of the tree; but as a great number of superfluous shoots will be produced, the mode of their removal requires to be noticed. The operation is termed disbudding, and it commences as soon as the young shoots can be laid hold of, but should be completed in a gradual manner. A portion of such front shoots as have no fruit at their bases are first removed, then part of those elsewhere situated, making exceptions of the lowest on each bearing shoot, for succession, and of the terminal one. By degrees all are removed excepting the two last mentioned and those from nodes where fruit is set and promises to attain perfection. Finally, the terminal ones and those left on account of having fruit at their bases are shortened, or stopped, to about three inches in length, or so as to leave several leaves for the purpose of maintaining the flow of sap and elaborating it for the nourishment of the fruit. Should these or the terminal shoots again push, such secondary shoots must be pinched off above the second leaf from the origin.

Thinning the fruit is generally done much too sparingly. The vigour of the tree should of course be taken into consideration. As a general rule, one fruit on each bearing shoot, or two at most, are all that ought to be left. By leaving too many the size of the fruit is diminished, so that the aggregate weight of flesh is probably but little if at all increased, whilst that of stones, in the great weakening of the tree, becomes materially so. Some remove the flower-buds to a considerable extent, a practice which is very proper. It is advisable however to preserve several on each shoot, in order that a choice may be made of one or two of those likely to take the lead.

The surface of the border should be frequently stirred; and when the weather is dry, watering will be necessary both for the border and foliage; but the use of cold spring water must be avoided. The ravages of the green fly (*Aphis Persicae*) must be carefully guarded against. The best known remedy is to dust the tree, after syringing, with snuff, or powdered tobacco leaves. Coping-boards, made to project about a foot, are of great utility in protecting the blossoms; but after the danger of frost is over, the coping ought to be removed.

The best varieties of peaches in cultivation at the present day in this country appear to have been obtained from France. Although designated by various English names, most of the sorts have been traced to be synonymous with the French peaches.

The different varieties admit of the following classification:—

I. *Leaves serrated, glandless.*

a. Flowers large	Clingstones	§ 1.
	Melters	§ 2.
b. Flowers small	Clingstones	§ 3.
	Melters	§ 4.

II. *Leaves crenated or serrulated, with globose glands.*

a. Flowers large	Clingstones	§ 5.
	Melters	§ 6.
b. Flowers small	Clingstones	§ 7.
	Melters	§ 8.

III. *Leaves crenated or serrulated, with reniform glands.*

a. Flowers large	Clingstones	§ 9.
	Melters	§ 10.
b. Flowers small	Clingstones	§ 11.
	Melters	§ 12.

Six more sections might be formed by admitting subdivisions of middle-sized flowers; but no varieties worthy of cultivation, and indeed very few of any description, being referable to such sections, they have been consequently omitted.

The following list contains the best varieties of peaches, arranged according to the sections to which they respectively belong in the above classification.

Section 2. Early Anne, Noblesse, Malta.

Section 4. Royal George, Royal Charlotte.

Section 6. Acton Scot, Grosse Mignonne, Barrington.

Section 8. Bellegarde, George the Fourth, Late Admirable.

Section 10. Pourpré Hâtive.

Section 12. Chancellor.

(*Hort. Trans.*; *Guide to the Orchard and Kitchen Garden*; *Encyclopaedia of Gardening.*)

PEACOCK. [Pavoninae.]

PEAK OF DERBYSHIRE. [Derbyshire.]

PEAR, the wild pear-tree (*Pyrus communis*), from which the numerous cultivated varieties have originated, has a wide indigenous range extending over a great part of Europe and Asia, within the limits of temperate regions. It is to be met with in certain localities in the southern parts of Britain. The old varieties of pear are however getting rapidly out of cultivation, and giving place to others of recent origin, superior in quality, and much better adapted for this climate than the old kinds appear ever to have been. Few of the latter could be successfully cultivated without the aid of walls; whereas most of the new varieties produce abundance of excellent fruit on standards or dwarfs in the open ground. Even in France the old varieties are now decaying, although the climate is there most congenial to them.

The pear is chiefly propagated by grafting or budding on the wild pear stock, or on stocks raised from the seeds of cultivated pears, called free stocks; the former are however to be preferred. It is also grafted on the quince, which is most proper for dwarf trees, or for moist soil, and has also the effect of bringing the trees earlier into a bearing state. It may be also grown upon the medlar, and the white thorn (*Crataegus Oxyacantha*), but on these the disparity of growth between the respective stems occasions a short duration of the union. The enlargement of the pear-stem in the case of strong growing varieties is indeed generally too much for quince stocks. There are several varieties of the quince, and the sort that has the broadest leaves and which has the nearest correspondence in regard to horizontal growth with that of the pear should be preferred for stocks.

The pear-tree will thrive in any rich loamy soil; but it is only where the subsoil is naturally congenial, or rendered so artificially, that it will continue to produce good crops of well flavoured fruit. A clay subsoil is bad, and so is in fact any other that will hold water. Good drainage is absolutely necessary, and shallow planting cannot be too much recommended. The monks in former times were aware of the advantages arising from having the roots near the surface; for stones and slates have been found below old fruit-trees, which had been planted at monasteries once in their possession.

Manure is not so liable to prove injurious to the pear and apple as it is to stone-fruits. On the contrary, unless the trees be growing too strong, manure, judiciously applied, will always prove beneficial.

Pears are deemed worthy of the expense of walls, but this is often an unnecessary expenditure for want of a properly formed border, and thorough draining, where the subsoil renders such necessary. Brick rubbish is a good bottoming; or a bed of concrete, two or three inches thick, laid sloping from the wall towards a drain in front, is unquestionably one of the best modes that could be practised; and it is the only effectual one to prevent the roots from penetrating beyond a limited depth; for they will often find their way through a stratum of stones or brick rubbish. The depth of soil need not exceed 2½ feet. The best season for transplanting is in the beginning of winter, or as soon as the leaves have fallen in autumn.

Standard trees may be planted from 20 to 30 feet apart, or where vegetables are intended to be cultivated, the distances may be 40 feet between the rows and 20 feet in the rows. Dwarf trees, or quince stocks, will not require more than 15 feet distance. Wall-trees should be at least 20 feet apart, and for some varieties 30 feet will not be too much.

The modes of training the pear-tree are various. Against walls, the three principal methods are the fan shape, its reverse the pendulous, and intermediately the horizontal, which is that most generally adopted. In the fan method the central part of the tree, from the upright position of the branches, or their near approach to such, is apt to become too strong. On the contrary, the pendulous training induces debility when the trees begin to bear heavy crops. By annually cutting back a central shoot to about a foot, and training branches horizontally, right and left, the vigour of the tree is equally distributed. It often happens that in this mode the branches only produce fruit towards their extremities. When this is the case, a shoot should be encouraged near the origin of the horizontal branch, and trained in the interval, and at some distance, say three feet; farther along the branches another may be laid in a similar manner, and so on, care being taken that each is stopped when its elongation reaches the place where another has its origin. These shoots will generally become as fruitful, after two or three years, as the portion of wood of the same age near the extremities of the branches themselves.

Training against espaliers was formerly more practised than at present. The difficulty of getting the old varieties to bear, apart from a wall, together with the expense of erecting the espalier, and the liability of its materials to decay, have no doubt tended to bring this mode into disuse. It is however worthy of remark, that a greater extent of foliage can be exposed to direct light by espalier training than by any other on an equal extent of ground. New varieties will do away with the objection of unproductiveness; and although the contact of metallic substances is not congenial to vegetable growth, yet the principal supports of the espalier might be constructed of cast-iron, which would prove an ultimate saving; the small intermediate wood work that would be requisite could be easily replaced.

In the cultivation of pears as standards, the head is allowed to take nearly its natural course, being only subjected to such regulations, by pruning, as are necessary to preserve the equality of the principal branches with regard both to strength and distance; and likewise to render the whole sufficiently thin, in order that the sun's rays may be freely admitted.

In some situations, many kinds of pears remain long unfruitful; the best means of rendering them otherwise is of course a most important desideratum. So long as circumstances are very favourable for the growth of wood, blossom-buds are not likely to be produced; the production of the latter results from a more inspissated state of the juices; and will not take place whilst a copious flow of sap is continued. This may be interrupted by ligatures, ringing, grafting, or other analogous means. But these means frequently afford only a temporary remedy, and a repetition of the process is at the expense of the energies of the tree, so that it is rendered too weak for future bearing. There is still a more important object which the above means are not calculated to affect. If the roots are in a cold subsoil or out of the reach of solar influence, the fruit will only acquire an inferior degree of flavour. If however the tree be carefully removed (for doing which autumn is the best season), the soil well dug, or even renewed, and the tree deprived of such roots as cannot be brought to a horizontal position, namely, that in which all the others should be placed when replanted, and if this be done as shallow as possible, a satisfactory check will be occasioned, fruitfulness induced, and flavour communicated.

The management of dwarf standards is similar to that required for tall standards, excepting that the head is formed at the height of one or two feet from the ground, instead of six, the usual height allowed for the stems of standard trees in orchards, or where under-cropping is carried on, as in market-gardens, where the dwarf-headed trees would obstruct the growth of vegetables for a considerable distance from their stem. Dwarfs however have some important advantages; a large head is sooner formed, and the fruit is not so liable to be blown down.

The French modes of training *en Quenouille* or *en Pyramide* cannot be strictly adopted in this country with advantage, owing to the richness of the soil and moisture of the climate, circumstances which are favourable to the production of shoots rather than fruit-buds, and this tendency is farther encouraged by shortening the shoots to the extent which the French recommend. In both these modes tiers of branches proceed from a central stem; in the pyramidal form the branches are horizontal, each tier being successively shorter than the one below. In the Quenouille the branches are curved downwards, and this mode might be successfully practised in this country, by leaving the shoots at full length, care being taken that all upright shoots are shortened in summer.

The pruning of standard pear-trees is usually confined to a winter regulation of the branches by thinning, and shortening where the subdivision of branches is desireable or where they are too weak. Wall and espalier trees require both a summer and winter pruning. In summer a number of shoots will be produced beyond that which will be required for training. If these are allowed to grow without interruption during a considerable part of the season, and then at once cleared away, the tree is apt to receive a shock from which it does not soon recover. If the shoots are shortened too much or too early, the buds, which would otherwise have proved blossom buds in the following spring, will immediately become excited (other channels for the flow of sap being cut off), and burst into shoots. [MORPHOLOGY.]

In order to avoid this, which is a case of frequent occurrence, a portion of these superfluous shoots should be first stopped at an early period, and afterwards another portion; by the middle of June part of them may be cut back to within two or three inches of their base; and thus by degrees the whole will be ultimately reduced, without any great or sudden derangement of the general flow of the sap. The winter pruning is attended with less vital danger to the tree. It consists chiefly in shortening spurs to the lowest fruit-buds and judiciously thinning them.

If borders are well made, there will be less occasion for raising the trees after they have been once planted. Still, after four or five years, it will, under all circumstances, prove advantageous to remove the trees from the wall, trench the border, and replant, spreading the roots near the surface in a horizontal direction, or inclining slightly downwards. Cutting the roots, without entirely removing the tree, is attended with the disadvantages arising from the partial loosening of the soil, and the difficulty of reaching the perpendicular portions of the root.

A selection of the best varieties of pears will be found enumerated in the article FRUIT.

PEARCE, ZACHARY, born 1690, died 1774, an eminent divine and scholar, and a prelate of the English church, who went through what has been the course of a large proportion of the persons of the class to which he belongs, the grammar-school, the university, a city living, a deanery, and a bishopric. He was the son of a distiller in Holborn, and a pupil in Westminster School, from whence he passed to Trinity College, Cambridge. At Cambridge he was best known as a polite classical scholar, and it was in 1716, before he took orders, that he published his edition of Cicero *De Oratore*. He inscribed it, at a friend's suggestion, to Lord Chief-Justice Parker, though he was not known to him, and this circumstance led to a friendship and patronage which were of the greatest use to him. The Lord Chief-Justice, being made Lord Chancellor soon after, took Mr. Pearce into his family as his domestic chaplain. Preferment now flowed in upon him. He was presented to the living of Stapleford Abbots in Essex, St. Bartholomew, near the Royal Exchange, and finally of St. Martin's in the Fields, London. This last appointment was in 1723. He was made dean of Winchester in 1739, in 1748 bishop of Bangor, and in 1756 bishop of Rochester, with the deanery of Westminster annexed, which he afterwards resigned. He wished also to resign his bishopric, that he might complete certain literary labours in which he was engaged, and have, as he expressed it, some interval of repose between the business of life and eternity. His application to the crown for permission to resign is a remarkable circumstance in his history. It was a new case, and there were difficulties about the appointment of a successor. Finally, the king, George III., intimated personally to the bishop that it must not be thought of. He died at Little Ealing, January 29, 1774.

Passing over single sermons, or small tracts, of which bishop Pearce was the author, he published, after his edition of Cicero's 'Orator,' an edition of Longinus, with a new Latin version; a Review of the Text of 'Paradise Lost;' and the 'Miracles of Jesus Vindicated;' but the theological work by which he is best known, and which is universally considered to be a most valuable addition to biblical literature, was not published till after his death, when it appeared with the title of 'A Commentary, with Notes, on the Four Evangelists and the Acts of the Apostles, together with a new translation of St. Paul's First Epistle to the Corinthians,' 2 vols. 4to., 1777. There are also four volumes of Sermons on various subjects by him, another posthumous work, published in 1778. An account of his life is prefixed to the Commentary

It remains to be added that he numbered among his friends some of the most eminent men of the age, and that he was highly esteemed and venerated throughout his long life.

PEARL. [Shells.]

PEARL FISHERY. The fisheries which are carried on to supply the market of the world with pearls are numerous, and some of them are of very antient date: thus the fishery at Catifa in Arabia, which produced the pearl bought by Tavernier for 110,000*l*., was celebrated in Pliny's time.

In the Old World, the west coast of Ceylon, that of Coromandel and the Persian Gulf, are among the more prominent stations. The Algerine coast and the Soolan Islands also furnish a certain share.

In the New World, the neighbourhood of St. Margarita, or Pearl Island, and other localities on the coast of Colombia, furnish a great many, and the Bay of Panama also contributes considerably; but the pearls which we have seen from the Western world, though many of them are large, cannot be compared with those of the East in shape, colour, and general beauty.

Of the latter fisheries, those at Ceylon and Tuticoreen (coast of Coromandel) are monopolies; the first belonging to the government, and the second to the East India Company; but they cannot be considered of much value, for the rent at which the fishery is let seldom covers the expenses of management, guarding, &c.

The Bahrein Islands (Persian Gulf) give a most abundant harvest of these beautiful molluscous secretions; perhaps the most abundant in the world. Sixty thousand tomauns of Bassorah, about 80,000*l*. sterling of our money, and often more, are derived from the fishery in about two months, the time during which it lasts, the commencement being in June. Here there is no monopoly; but any one may engage in the adventure upon payment of a tax on the produce to the government. The Persians principally are engaged in it, and the divers are of that nation.

The Western pearl fisheries, especially those on the coast of Colombia, must have been very valuable once. Seville alone is said to have imported upwards of 697 lbs. in the year 1587. The second Philip's celebrated pearl, which weighed 250 carats, and was valued at 150,000 dollars, came from Margarita. These prizes were not forgotten in 1825, when joint-stock companies raged. One company undertook the prosecution of the Colombia fishery, and another embarked in that of Panama and the Pacific, both with about the same success; for in 1826 they were abandoned. Some fine specimens of the shells of Mollusca were sent home by one of them. The Algerine ground was also, we believe, undertaken by an English company in 1826.

The pearls which are the objects of these fisheries are found in the shells of *Meleagrinae*, or pearl-oysters, as they are called, and principally in those of the species named *Avicula* or *Meleagrina margaritifera*. The best ground is considered to range at depths varying from 6 to 8 fathoms; and the divers, who usually are unhealthy and short-lived, are said to be able to remain generally from a minute to a minute and a half under water. Two minutes, four, and even six, have been mentioned; but constructed as the human respiratory and circulating system is, we should think the last-mentioned periods must be very rare. A submersion of a minute and a half is calculated to do mischief enough in ordinary cases. The following account of one of these fisheries is from Percival's 'Ceylon:'—

'There is perhaps no spectacle,' says the author, 'which the island of Ceylon affords more striking to a European than the bay of Condatchy during the season of the pearl-fishery. This desert and barren spot is at that time converted into a scene which exceeds, in novelty and variety, almost anything I ever witnessed; several thousands of people of different colours, countries, casts, and occupations continually passing and repassing in a busy crowd; the vast numbers of small tents and huts erected on the shore, with the bazar or market-place before each; the multitude of boats returning in the afternoon from the pearl banks, some of them laden with riches; the anxious expecting countenances of the boat-owners, while the boats are approaching the shore, and the eagerness and avidity with which they run to them when arrived, in hopes of a rich cargo; the vast numbers of jewellers, brokers, merchants, of all colours and all descriptions, both natives and foreigners, who are occupied in some way or other with the pearls, some separating and assorting them, others weighing and ascertaining their number and value, while others are hawking them about, or drilling and boring them for future use;—all these circumstances tend to impress the mind with the value and importance of that object which can of itself create this scene.

'The bay of Condatchy is the most central rendezvous for the boats employed in the fishery. The banks, where it is carried on, extend several miles along the coast from Manaar southward off Arippo, Condatchy, and Pomparipo. The principal bank is opposite to Condatchy, and lies out at sea about twenty miles.' After the survey of the state of the beds and the consequent report to government, the particular banks to be fished are put up for sale to the highest bidder, and are usually purchased by a black merchant. The government however sometimes judges it more advantageous to fish the banks on its own account, and to dispose of the pearls to the merchants.

The banks are divided into three or four different portions, which are fished annually in succession. These portions are completely distinct, and are set up separately to sale, each in the year in which it is to be fished. A sufficient interval is thus given to the oysters to attain their proper growth; and as the portion first used has generally recovered its maturity by the time the last portion has been fished, the fishery becomes almost regularly annual, and may thus be considered as yielding a yearly revenue. The oysters are supposed to attain their complete state of maturity in seven years.

The fishing season commences in February and ends about the beginning of April. The period allowed to the merchant to fish the banks is six weeks or two months at the utmost; but there are several interruptions which prevent the fishing days from exceeding more than about thirty. If it happen to be a very bad season, and many stormy days intervene during the period allotted, the purchaser of the fishery is often allowed a few days more. 'One considerable interruption proceeds from the number and diversity of holidays observed by the divers of different sects and nations who are employed.' Many of the divers are of a black race, known by the name of Marawas and Parawas, who inhabit the opposite coast of Tuticoreen; these people, although of the Malabar caste, are Roman Catholics, and leave off work on Sundays to attend prayers at the chapel of Arippo.

The boats and donies employed in the fishery do not belong to Ceylon, but are brought from the Coromandel and Malabar coasts. The divers from Colang are accounted the best, and are only rivalled by the Lubbahs, a tribe of Moors, who remain on the island of Manaar for the purpose of being trained in this art. Previous to the commencement of the fishery, all the boats rendezvous at Condatchy, and it is here that they are numbered and contracted for. They regularly sail out and return together.

'A signal gun is fired at Arippo about ten o'clock at night, when the whole fleet sets sail with the land-breeze. They reach the banks before day-break, and at sun-rise commence fishing. In this they continue busily occupied till the sea-breeze, which arises about noon, warns them to return to the bay. As soon as they appear within sight, another gun is fired and the colours hoisted, to inform the anxious owners of their return. When the boats come to land, their cargoes are immediately taken out, as it is necessary to have them completely unloaded before night. Whatever may have been the success of their boats, the owners seldom wear the looks of disappointment; for although they may have been unsuccessful one day, they look with the most complete assurance of better fortune to the next; as the Brahmins and conjurers, whom they implicitly trust in defiance of all experience, understand too well the liberality of a man in hopes of good fortune not to promise them all they can desire.'

'Each of the boats carries twenty men, with a tindal, or chief boatman, who acts as pilot. Ten of the men row and assist the divers in re-ascending. The other ten are divers; they go down into the sea by five at a time; when the first five come up, the other five go down; and by this method of alternately diving, they give each other time to recruit themselves for a fresh plunge.'

'In order to accelerate the descent of the divers, large stones are employed; five of these are brought in each boat for the purpose; they are of a reddish granite common in this country, and of a pyramidal shape, round at top and bottom, with a hole perforated through the smaller end sufficient to admit a rope. Some of the divers use a stone shaped like a half-moon, which they fasten round the belly when they mean to descend, and thus keep their feet free.

'These people are accustomed to dive from their very infancy, and fearlessly descend to the bottom in from four to ten fathoms water in search of the oysters. The diver, when he is about to plunge, seizes the rope to which one of the stones we have described is attached, with the toes of his right foot, while he takes hold of a bag of net-work with those of his left, it being customary among all the Indians to use their toes in working or holding as well as their fingers; and such is the power of habit, that they can pick up even the smallest thing from the ground with their toes almost as nimbly as a European could with his fingers. The diver thus prepared seizes another rope with his right hand, and holding his nostrils shut with the left, plunges into the water, and by the assistance of the stone speedily reaches the bottom. He then hangs the net round his neck, and with much dexterity and all possible despatch collects as many oysters as he can while he is able to remain under water, which is usually about two minutes. He then resumes his former position, makes a signal to those above by pulling the rope in his right hand, and is immediately by this means drawn up and brought into the boat, leaving the stone to be pulled up afterwards by the rope attached to it.'

The serious effects which so protracted a submersion must produce upon the human frame are manifested by a discharge of water from their mouths, ears, and nostrils, and, frequently, of blood. But this does not hinder them from going down again in their turn. 'They will often,' continues our author, 'make from forty to fifty plunges in one day, and at each plunge bring up about a hundred oysters. Some rub their bodies over with oil, and stuff their ears and noses to prevent the water from entering, while others use no precautions whatever. Although the usual time of remaining under water does not much exceed two minutes, yet there are instances known of divers who could remain four and even five minutes, which was the case with a Caffre boy the last year I visited the fishery. The longest instance ever known was that of a diver who came from Anjango in 1797, and who absolutely remained under water full six minutes.'

The last-named period seems almost incredible, but there is no reason to doubt Captain Percival's evidence. The chief horror and danger awaiting the diver are concentrated in the ground-shark. This animal is a common and fearful inhabitant of all the seas in these latitudes; and its terrors are so continually before the eyes of the divers, that they seek a vague safety in supernatural means. Before they begin diving, the priests or conjurers, who are known in the Malabar language by the name of *Pillal Karras*, or binders of sharks, are always consulted, and whatever the conjurer says to them is received with the most implicit confidence. The preparation which he enjoins them consists of certain ceremonies according to the caste and sect to which they belong, and on the exact performance of these they lay the greatest stress; nor will they on any account descend till the conjurer has performed his ceremonies. His advices are religiously observed, and generally have a tendency to preserve the health of the devotee. The diver is usually enjoined to abstain from eating before he goes to plunge, and to bathe himself in fresh water immediately after his return from the labours of the day. During the time of the fishery the conjurers stand on the shore till the boats return in the afternoon, muttering prayers, distorting their bodies into various strange attitudes, and performing ceremonies. All this time they ought to abstain from food or drink; but they sometimes regale themselves with toddy, till they are no longer able to stand at their devotions.

Some of the conjurers frequently go in the boats with the divers, who are greatly delighted at the idea of having their protectors along with them, and become additionally venturous. The zeal of the conjurers who go in the boats appears to be stimulated by the hope of a valuable pearl. As a body, these keepers of the consciences of the sharks reap a rich harvest; for, besides being paid by the government, they get money and presents of all sorts from the black merchants and those successful in fishing up the oysters.

'The address of these fellows,' adds Captain Percival, 'in redeeming their credit when any untoward accident happens to falsify their predictions, deserves to be noticed. Since the island came into our possession, a diver at the fishery one year lost his leg, upon which the head conjurer was called to account for the disaster. His answer gives the most striking picture of the knowledge and capacity of the people he had to deal with. He gravely told them that an old witch who owed him a grudge had just come from Colang, on the Malabar coast, and effected a counter conjuration which for a time rendered his spells fruitless; that this had come to his knowledge too late to prevent the accident which had happened, but that he would now show his own superiority over his antagonist by enchanting the sharks and binding up their mouths, so that no more accidents should happen during the season. Fortunately for the conjurer, the event answered his prediction, and no further damage was sustained from the sharks during the fishery of that year. Whether this was owing to the prayers and charms of the conjurer, I leave my European readers to decide; but certainly it was firmly believed to be the case by the Indian divers, and he was afterwards held by them in the highest esteem and veneration.'

The divers are paid differently, according to their private agreement with the boat-owners, either in money or with a proportion of the oysters caught, which they take the chance of opening on their own account: the latter is the method most commonly adopted. The agreements with the people who hire out the boats are conducted much in the same manner. They contract either to receive a certain sum for the use of their boats, or pay the chief farmer of the banks a certain sum for permission to fish on their own account. Some of those who pursue the latter plan are very successful and become rich, while others are great losers by the speculation. The spirit of gambling is more openly exhibited, for oyster lotteries are carried on to a great extent, and they consist of purchasing a quantity of the oysters unopened, and running the chance of either finding or not finding pearls in them. These lotteries are great favourites with European officers and gentlemen. The boat-owners and merchants lose some of the best pearls while the boats are on their return to the bay from the banks, as the oysters, when alive and left for some time undisturbed, frequently open their shells of their own accord: a pearl may then be easily discovered, and the oyster prevented, by means of a bit of grass or soft wood, from again closing its shell till an opportunity offers of picking out the pearl. 'Those fellows who are employed to search among the fish also commit many depredations, and even swallow the pearls to conceal them: when this is suspected, the plan followed by the merchants is to lock the fellows up and give them strong emetics and purgatives, which have frequently the effect of discovering the stolen goods.'

Captain Percival thus concludes his interesting account:—'As soon as the oysters are taken out of the boats, they are carried by the different people to whom they belong and placed in holes or pits dug in the ground to the depth of about two feet, or in small square places cleared and fenced round for the purpose, each person having his own separate division. Mats are spread below them to prevent the oysters from touching the earth, and here they are left to die and rot. As soon as they have passed through a state of putrefaction and have become dry, they are easily opened without any danger of injuring the pearls, which might not be the case if they were opened fresh, as, at that time, to do so requires great force. On the shell being opened, the oyster is minutely examined for the pearls; it is usual even to boil the oyster, as the pearl, though commonly found in the shell, is not unfrequently contained in the body of the fish itself.

'The stench occasioned by the oysters being left to putrefy is intolerable, and remains for a long while after the fishery is over. It corrupts the atmosphere for several miles round Condatchy, and renders the neighbourhood of that country extremely unpleasant till the monsoons and violent south-west winds set in and purify the air. The nauseous smell however is not able to overcome the hope of gain: for months after the fishing season, numbers of people may be seen earnestly searching and poring over the sands, places where the oysters had been laid to putrefy; and some are now and then fortunate enough to find a pearl amply compensates their trouble in searching after it. In 1797, while Mr. Andrews was collector, a Cooly, or com-poor fellow of the lowest class, got by accident the most valuable pearl seen that season, and sold it to Mr. Andrews for a large sum.

'The pearls found at this fishery are of a whiter colour than those got in the Gulf of Ormus, on the Arabian coast, but in other respects are not accounted so pure, or of such an excellent quality; for though the white pearls are more esteemed in Europe, the natives prefer those of a yellowish or golden cast. Off Tutucoreen, which is on the Coromandel coast, nearly opposite to Condatchy, there is another fishery; but the pearls found there are much inferior to those two species I have mentioned, being tainted with a blue or greyish tinge.

'In preparing the pearls, particularly in drilling and stringing them, the black people are wonderfully expert. I was very much struck with the instrument they employ in drilling, as well as the dexterity with which they use it. A machine made of wood, and of a shape resembling an obtuse inverted cone, about six inches in length and four in breadth, is supported upon three feet, each twelve inches long. In the upper flat surface of this machine holes or pits are formed to receive the larger pearls, the smaller ones being beat in with a little wooden hammer. The drilling instruments are spindles of various sizes, according to that of the pearls; they are turned round in a wooden head by means of a bow handle, to which they are attached. The pearls being placed in the pits which we have already mentioned, and the point of the spindle adjusted to them, the workman presses on the wooden head of the machine with his left hand, while his right is employed in turning round the bow handle. During the process of drilling, he occasionally moistens the pearl by dipping the little finger of his right hand in a cocoa-nut filled with water, which is placed by him for that purpose; this he does with a dexterity and quickness which scarcely impede the operation, and can only be acquired by much practice.

They have also a variety of other instruments both for sorting and drilling the pearls. To clean, round, and polish them to that state in which we see them, a powder, made of the pearls themselves, is employed. These different operations in preparing the pearls occupy a great number of the black men in various parts of the island. In the black town or pettah of Columbo, in particular, many of them may every day be seen at this work, which is well worth the attention of any European who is not already acquainted with it.' [AVICULA; MALLEACEA; SHELL.]

PEARL-ASH. [POTASSIUM.]

PEARL-HEN. [PAVONIDÆ.]

PEARL-OYSTER. [AVICULA; MALLEACEA.]

PEARL-RIVER. [MISSISSIPPI, STATE OF.]

PEARL-SPAR, a mineral which occurs massive, and also crystallized. The primary form is an obtuse rhomboid, the angle of which is but little different from that of the magnesian carbonate of lime; but the curvature of the planes prevents exact measurement. Cleavage easily effected parallel to the faces of the primary form. Hardness sufficient to scratch carbonate of lime readily. Colour whitish, greyish or yellowish, or brownish. Lustre pearly in general. Translucent. Opaque. Specific gravity 2·83.

Dissolves slowly in nitric acid. The fragments heated by the blow-pipe are attracted by the magnet.

It occurs abundantly in the lead-mines of the north of England, in those of Derbyshire, and also in Devonshire and Cornwall. It occurs also in many parts of Europe and America. Analysed by Hisinger it yielded:—

Carbonic acid	44·80
Lime	27·97
Magnesia	21·14
Oxide of iron	2·40
Oxide of manganese	1·59
	98·01

PEARL-STONE occurs massive in great beds in clay, porphyry, and secondary trap rocks. The structure is granular; it consists of roundish masses which vary in size, and which are sometimes from one to two inches in diameter; these are formed of thin concentric laminæ. The surface is smooth and shining, and the lustre pearly. Opaque. Translucent on the edges. Very easily frangible. Fracture uneven. Colour usually grey, but sometimes blackish or reddish brown. Hardness 5·5 to 6. Specific gravity 2·34.

Found at Tokay in Hungary, and in Spain.

A specimen from Spain gave, by Dr. Thomson's analysis—

Silica	76·100
Alumina	11·800
Peroxide of iron	2·284
Lime	3·090
Potash	3·500
Water	4·280
	98·604

PEARLS AND MOTHER-OF-PEARL consist, according to Mr. Hatchett, of carbonate of lime and albumen.

PEARSON, JOHN, born 1612, died 1686, a prelate of the church of England, and the author of 'An Exposition of the Creed,' a work which, having been greatly used up to the present time as a kind of text-book in the examination of candidates in divinity, has maintained a high celebrity, and been several times reprinted. He was a native of the village of Snoring, educated at Eton, from whence he went to Cambridge, and took holy orders in 1639, on the eve of the civil wars. Lord-Keeper Finch appointed him his chaplain, and presented him to the living of Torrington in Suffolk. But the chief scene of his labours as a parochial minister was in London, where he had the living of Saint Clement Eastcheap, and it was to the inhabitants of that obscure parish that the lectures were delivered which afterwards formed his celebrated Exposition, and to them that work when so published was dedicated. The first edition was in 1659, and in the same year he published the works of Hales of Eton, giving to them the title of 'Golden Remains of the ever memorable John Hales.' Hales had died a short time before in penury and distress, having been deprived of his means of subsistence by the fanatical people who for a time obtained the ascendency in the English church.

On the Restoration a proper regard was had for Pearson's eminent merits as a rational divine and diligent preacher. He was created doctor of divinity by the king's mandamus, made a prebendary of Ely, archdeacon of Surrey, and finally, master of Jesus College, Cambridge. All this was accomplished before the end of the year 1660, in which the king was restored. In 1661 he was appointed Lady Margaret's professor of divinity, and in 1662 master of Trinity College, Cambridge. In 1672 he succeeded Wilkins in the bishopric of Chester. He died at Chester, July 16, 1686.

The 'Exposition of the Creed' is the work by which Bishop Pearson is chiefly remembered, which has not only been reprinted, but abridged by various persons. Besides this work, he is the author of a 'Vindication of the Epistles of St. Ignatius,' and of 'Dissertations on the Rise and Succession of the early Bishops of Rome.' The last was a posthumous publication, which also contains the 'Annales Paulini,' a critical dissertation on the series of events in the life of St. Paul.

PEARSON, EDWARD, D.D., born about 1760, died 1811, a divine of the church of England, who, if his life had continued a few years longer, would probably have attained to one of the higher dignities in that church. As it is, it is as having well discharged himself of various duties in the University of Cambridge, to which he belonged, and of the duties of a parish priest at Rempston in Nottinghamshire, where he was rector, and having had by his writings no small influence in the church, that we have here to speak of him. He was a native of Ipswich, educated at Cambridge, where he was for awhile fellow and tutor of Sidney College, and afterwards master, and elected the Christian Advocate in 1809. Beside numerous single sermons preached by him on public occasions, Dr. Pearson was the author of a volume of thirteen Sermons addressed to Academic Youth, delivered by him in St. Mary's Church, Cambridge. He published also a 'Collection of Prayers for the use of Families,' and various tracts in divinity not professedly controversial. But his fame chiefly rests on his controversial writings against antagonists of two very opposite descriptions. There are two treatises of his against those who adopt Dr. Paley's views on the general theory of moral obligation and those who follow him in some of the practical conclusions to which that celebrated divine and moralist conducts his readers. These treatises excited, when first published, great attention, and well deserve to be read by all in connection with the very popular and on the whole very excellent treatise on 'Moral and Political

Philosophy' to which they relate. On the other side, Dr. Pearson was among the first to sound an alarm respecting the danger to which the church was exposed by the spread in it of Calvinistic views of the Christian doctrine. On this subject he published various tracts at the beginning of the present century, several of which were expressly directed against Mr. Simeon, who was the great maintainer of Calvinism in the university to which Dr. Pearson belonged. In fact, he stood forth the champion of the Arminian clergy in the church, and the champion at the same time of the church itself against whatever seemed to threaten its integrity and its perpetuity.

It seems unnecessary to give the titles of a long list of writings in divinity; but it may be useful to say that a complete list, arranged chronologically, may be seen in the 'Gentleman's Magazine' for 1811, where it is also said of him that he was a good man, of gentle and benevolent manners, kind and charitable, easy and pleasant in conversation, modest, unassuming, much respected, and beloved. He died on August 17, 1811.

PEAT is a substance of vegetable origin, found wherever the soil has been long soaked with water which has no outlet and does not completely evaporate by the heat of the sun.

When dried peat is examined, it is found to consist of roots and fibres in every stage of decomposition, from the natural wood to the completely black vegetable mould. From the nature of its formation under the surface of water, it acquires a portion of tannin, which has the property of preserving animal and vegetable matter from decomposition. Hence large branches and trunks of trees are found imbedded in peat, which have no mark of decomposition, except what may have taken place before the wood was completely immersed in the peat. Peat contains all the elements of the richest manure, and may by an easy process be converted into humus: for this purpose the agency of alkalis is the most effectual. If the tannin be decomposed, that of the vegetable fibre will go on, and soluble humus will be formed. When peat is newly dug up, if caustic lime be added to it before it is dry, the moisture of the peat slakes the lime, which acts on the gallic acid in the peat and neutralises it. If this mixture be then excited to fermentation by the addition of animal matter, such as urine or dung, oxygen is absorbed and carbonic acid evolved; and the residue is converted into an excellent manure, containing much soluble humus. The same may be effected more slowly by mixing peat with clay or marl, and allowing the mixture to remain exposed to the atmosphere for a considerable time, frequently turning it. But nothing accelerates this process like the addition of putrescent animal matter, which acts as a ferment and greatly hastens the decomposition.

The soils for which peat forms the best manure are the chalky and clayey. Sand has too little tenacity; it lets the gasses produced by the decomposition escape, instead of attracting them, as clay and chalk do, and preventing their escape.

The burning of peat destroys the vegetable matter and leaves the earths and salts behind. They are accordingly very strong stimulants to vegetation, especially that of clovers and herbaceous plants, of which the leaves and stems are the most valuable parts. If the soil is well furnished with vegetable matter, and capable of bringing an abundance of seed to perfection, it may be very useful to apply stimulating manures, such as peat ashes, to increase the verdure; but on poor soils destitute of humus, the increase of the stems and leaves does not ensure a proportionate increase of seed. Hence it is often remarked that soot, potash, saltpetre, and similar substances produce a deceitful growth, giving a rank green leaf, which is not succeeded by a heavy ear; but, on the contrary, the produce in seed is rather diminished than increased by the use of the manure. Whenever a stimulating manure is used, the soil should be naturally rich, or enriching manure should be applied at the same time. It is of no use to whip a horse which has had no corn and is half starved; and land which is exhausted cannot be made productive by applying lime or ashes, or saline substances, which in a richer soil abounding in humus would have excited the most vigorous vegetation.

The following particulars of the conversion of peat into a rich compost were given by Lord Meadowbank about forty years ago, and show that the principles which we have here laid down were known to him.

He recommends taking the peat out of the moss some time before it is used, that it may lose a portion of its moisture, and be lighter to carry. It is then to be carted to a dry spot, where the compost heap is to be formed. A bottom of peat is to be laid six inches deep and fifteen feet wide; on this are to be put ten inches of good yard-dung, then six inches more peat, and over this four inches of dung, and so alternately to the height of four or five feet. The whole should then be enclosed all round with a wall of peat, and covered with the same material. The proportion of the dung is about seven cart-loads to twenty-one of peat, if the weather is mild; but more dung is required if the weather is cold: over this heap ashes or lime may now be spread, in the proportion of a cart-load to twenty-eight of the compost. The dung should not have fermented much before it is used, and if it is watered with urine or the drainings of a dunghill, the effect will be more rapid. Animal matter, such as the refuse of slaughter-houses, and every substance which will readily undergo the putrefactive fermentation, will accelerate the process, and save dung in the compost. Where pigeons'-dung can be procured, a much smaller quantity will produce the desired effect. The heap should not be pressed down, but left to settle by its own weight. If the heat produced by the fermentation is very great, the whole heap may be turned over and more peat added to it. This will keep up the heat till the whole is reduced to a uniform mass of black mould. It may then be put on the land in the same quantity that farm-yard dung would have been, and consequently, by a little labour, four times the quantity of manure is produced by the mixture of the peat with the dung. It is found that lime is not essential to the formation of this compost. The fermentation excited is sufficient to decompose the tannin and convert it into a soluble extract. The fibres, partially decomposed, are reduced to vegetable mould, and the whole assumes a uniform and dark appearance. A complete chemical change has taken place, and the peat, from being very inflammable, is now scarcely capable of combustion, and that only in a very great heat. There is no better or more economical mode of converting peat into a rich manure. In summer the whole process may be completed in eight or ten weeks; in winter it takes a longer time; and it may be useful to give the heap an occasional lining of fresh dung, as is done with hotbeds in gardens to renew the heat.

Where a great extent of peat-moss renders the improvement of it desirable there are various ways in which it may be reclaimed. In some places the peat has been removed, and the loam which lay below it was found of a very fertile nature. This could only be done on the banks of rivers, into which the peat was floated by means of small canals dug through it, and communicating with the river. In all other cases the mode adopted has been that of draining and consolidating. In draining a peat-moss the water must not be let off too rapidly, for in that case the surface may become so loose and dry, that no vegetation can take place in it. If the water is drained off so as to leave two feet of peat dry above its level, this is all that is required for a beginning. The best improvement, and the most rapid, is produced by bringing sand or gravel in sufficient quantity to cover the surface with two or three inches of it. This will make a beginning of a soil, in which potatoes may be planted. At first the surface will not bear the wheels of a cart nor the tread of a horse; but in a short time a solid crust will be formed, which will increase in strength and thickness as cultivation advances. There are many fine pastures in Scotland which once were bare peat-mosses, on which it would have been dangerous for a man to walk, but which now bear heavy oxen, and seem as solid as any pasture on a clay subsoil. Manuring and liming are the most effective operations in bringing about this great improvement. Potatoes and oats are usually the first crops on reclaimed peat-mosses. It is long before they become capable of bearing wheat; nor is this crop to be recommended at any time, unless there be a good depth of soil formed over the peat. Laying down to grass as soon as a certain degree of improvement has been made, and pasturing with sheep at first and cattle afterwards, tend more than any other means to consolidate the surface and deepen the mould, which gradually increases by the decomposition of the tannin in the peat.

A patent has been lately obtained by Mr. W[illegible], managing director of the Dublin Steam Navigation Company, for compressing peat into a dense mass, so as t eable coal. It is said to be superior to coal in its properties of producing heat by combustion, forming an excellent charcoal or coke. It is asserted that this charcoal is much more combustible than that of wood, and very useful in the manufacture of fire-works. Mr. Williams has found that with 10 cwts. of pit-coal and 2½ cwts. of his factitious coal, the same quantity of steam can be generated as with 17½ cwts. of pit-coal alone.

The process is as follows:—Immediately after being dug it is triturated under revolving edge-wheels faced with iron plates perforated all over the surface, and is forced by the pressure through these apertures, till it becomes a species of pap, which is freed from the greater part of its moisture by a hydraulic press. It is then dried, and converted into coke in the same manner as is done with pit coal. The factitious coal of Mr. Williams is made by incorporating pitch or resin melted in a cauldron with as much of the peat-charcoal ground to powder as will form a tough doughy mass, which is then moulded into bricks. (Dr. Ure's *Dictionary of Arts and Manufactures.*)

The use of peat for fuel is too well known to require notice, but it may be interesting to know how peat is made in Holland, where it cannot be dug out of the solid mass, but is brought up in the form of mud from a considerable depth under water. It is raised by means of small strong nets fixed by an iron ring to a long pole, in the manner in which canals are cleared of mud. This liquid peat is brought in boats to a place prepared for its manufacture, which has been levelled as a brick-yard usually is. The soft mud is spread over this to the depth of six inches, and the water is allowed to drain off slowly: when the peat begins to dry, men fix boards to their feet and walk over it, so as to compress it; and as soon as it will bear cutting, it is cut with a spade made on purpose into oblong pieces of the usual size of peat, which is about eight or nine inches long and five wide; the treading and drying have reduced the thickness to about four or five inches. When tolerably solid, these peats are set on edge, and afterwards stacked loosely, so that the air may pass through them. In some places they have sheds for the purpose of protecting them from rain. They soon become very hard, and burn more like wood or coal than the peat which is cut immediately from a solid mass. They give a very great heat, and form a coal which, when it is shut up in a close vessel to stop the combustion, and allowed to cool, has a considerable resemblance to charcoal. The ashes of this peat contain very little earth, and are very light and white. They are abundantly used as a top-dressing for grass and clover on light lands, and for this purpose are extensively exported to the sandy districts in Guelderland and Flanders. They are not so much prized for stiff soils. Dutch peat is used as fuel for all the purposes of manufactures, except for the forging of iron, for which coals are imported from England and the Netherlands. The peat-bogs in Holland begin to be exhausted, and the fuel is so dear, that it is found more economical to import coals from England, which are used chiefly in cast-iron stoves.

PECCARY. [Swine.]

PECCHIO, GIUSEPPE, born at Milan in 1785, studied at the college of [illegible] under the well-known Father Soave, and afterwards proceeded to Pavia to study the law. After taking his degree in that university, he returned to Milan, and in 1810 was appointed assistant counsellor of state for the departments of finances and the interior of the kingdom of Italy. In 1814 he lost his situation, in consequence of the Austrian occupation of Lombardy, a circumstance which gave occasion to his work entitled 'Saggio Storico sulla Amministrazione Finanziera dell' ex-Regno d'Italia dal 1802 al 1814,' which is a useful book of reference for the history and statistics of that kingdom. In 1819 he was appointed deputy to the Congregazione, or provincial assembly of Milan. In 1821, being seriously implicated in the attempt at an insurrection against the Austrian government, he was obliged to emigrate. He first went to Switzerland, and from that country to Spain, which was then making a second experiment of a constitutional government. Pecchio had thus an opportunity of observing the national character and the spirit of the various political parties. His observations on Spain are in the shape of letters, and published under the following title: 'Sei Mesi in Spagna nel 1821.' In 1822 he proceeded to Portugal, where the same passions and parties were at work, and he likewise recorded the impressions which he received in that country in another series of letters: 'Lettere à Lady G. O. dal Portogallo.' Like his predecessors Baretti, Alfieri, Byron, and others, he was struck with the inferiority of the Portuguese as a people to their Spanish neighbours. Returning to Spain, he visited the southern provinces of that kingdom, and was at Cadiz at the fall of the constitutional government in the summer of 1823. He then embarked at Cadiz for England, where he met several Italian friends and brother emigrants. In 1825 he was appointed, together with Count Gamba, by the Philhellenic Committee to convey to Greece the sum of 50,000*l.*, the fruits of a loan made for the Greeks. Having executed his commission at Nauplia, Pecchio visited Smyrna, from whence he embarked for England. In his short stay in the Levant, Pecchio found time to make and record his observations, as he had done in Spain and Portugal. That was a critical period for the Greek cause, as the Egyptians under Ibrahim were carrying everything before them in the Morea. Pecchio's account of the affairs of Greece was published in English, with that of other contemporary travellers: 'A Picture of Greece in 1825, as exhibited in the Narratives of James Emmerson, Joseph Pecchio, and W. H. Humphreys,' 2 vols. 8vo. The book was translated into French and German. Pecchio's account was afterwards published separately in the original Italian: 'Relazione degli Avvenimenti della Grecia.'

On his return to England, towards the end of 1825, Pecchio repaired to Nottingham, where he gave lessons in the modern languages, and he afterwards removed to an academy at York in the same capacity. Towards the end of 1829 he married an English lady of property, and went to reside with her at Brighton. He remained for seven or eight years in Brighton, where he wrote several works, in which he embodied his remarks upon England and the English. These remarks are expressed in a spirit of fairness and discrimination rarely found in the accounts of England by foreign writers.

Pecchio was an observer, and he was also happy-tempered and lively, a pleasant companion, and a man of the world. He came to England with prejudices against the country, but he took pains to study it, and became strongly attached to it. 'Brought up in the school of Napoleon,' he says of himself, 'dazzled by the splendour of his triumphal car and the trophies of his half hundred victories, seduced by the benefits which he had imparted to my own country, I harboured in my heart for many years a feeling of hostility to England, before I had an opportunity of knowing and studying the country.' (*L'Anno mille ottocento ventisei dell' Inghilterra*, the last paragraph.) And he observes, in the same work, that the Italian writers of the last century, Baretti, Algarotti, Genovesi, Filangieri, Alfieri, and others, were all admirers of England, but that during twenty years of war the sentiments of the Italians towards that country became changed rather through the influence of French opinions than from national animosity. The absolute government of Napoleon had succeeded in instilling into the rising generation a feeling of dislike to England as a part of their education. By daily repeating the words 'enemies of the Continent,' 'tyrants of the sea,' 'monopolists,' 'grasping shopkeepers,' 'pirates,' &c., the French persuaded themselves, as well as their Italian and other neighbours, that there was something monstrously horrible in the existence of England as a nation. Even men of abilities, such as Botta, Gioia, Monti, and others adopted the common prejudice, 'because they had not studied English history, and had not weighed in even scales the good and the evil that England had done to the rest of mankind, and compared them with the good and the evil that other nations had also done.' To his friend Ugoni, who invited Pecchio after his marriage to go and reside in France, he answered, 'I should become doubly rich in France as regards my income, but I should be poorer in peace of mind; I should lose that sentiment of security which I feel in this strong island, and I should miss the courteous hospitality and the equanimity of English life, which are to me a full compensation for the unpleasantness of the climate. . . . Even the view of the neighbouring cemetery in which I shall be buried some day is pleasant to me.' (Ugoni, *Vita e Scritti di Giuseppe Pecchio*, Paris, 1836, p. 36.) When he wrote this, Pecchio had been for some time suffering from a disease of the chest, which terminated his life in June, 1835. His death was calm and resigned, and he was buried in the parish churchyard of Hove near Brighton.

Besides the works already mentioned, Pecchio wrote:—

1, 'Osservazioni semi-serie di un Esule sull' Inghilterra,' being a series of sketches of English habits and manners, each sketch forming a separate chapter, and showing the shadows as well as the lights of English life. The sketches are true, humorous, and interesting. Many things strike a foreigner which appear commonplace to a native, but even a native may learn from Pecchio's book to form a more just estimate of his own country. Among other sketches, those of the Country Markets, the Sailors at Wapping, the Betrothed, the Young Ladies of England, and the Roads, deserve notice. In a chapter entitled 'England the Refuge of the Oppressed' he describes with much humour the curious mixture of emigrants of all countries whom he saw in London in 1823. 2, 'Storia della Economia pubblica in Italia,' 8vo., Lugano, 1829. This is perhaps the most important of Pecchio's works. A collection of the Italian economists was made by Custodi, which fills about fifty volumes. Pecchio has taken the principal of those writers in order of time, and has given a short but clear abstract of the works of each. He has added, first, an introduction on the progress of political knowledge in Italy; second, at the end of the work a comparison between the English and the Italian writers on political economy; and third, a statement of the improvements effected in the various Italian states during the eighteenth century, in consequence of the writings of the economists. A more full account of this book is given under POLITICAL ECONOMY. 3, 'Una Elezione di Membri del Parlamento in Inghilterra,' in which he describes a contested election at Nottingham in 1826. Like all Pecchio's sketches, it is true, vivid, and entertaining. 4, 'Vita di Ugo Foscolo.' This biography has been noticed under FOSCOLO. 5, 'Storia Critica della Poesia Inglese,' 4 vols. 12mo., 1834, which he left unfinished; besides other minor works, which are noticed in his biography by Ugoni.

PECK, a measure of two gallons, or the fourth part of a bushel. [BUSHEL.] It is used as a measure of dry goods only.

PECK, FRANCIS, a learned and industrious antiquary, was born at Stamford in Lincolnshire, May 4, 1692; and was educated in his native town. He afterwards went to Trinity College, Cambridge, where he took the degree of B.A. in 1715, and M A. in 1727. In 1723 he was presented to the rectory of Godeby Maureward in Leicestershire; and in 1736 he received a prebendal stall in the cathedral of Lincoln. His principal works were:—1, 'The Antiquarian Annals of Stamford, in Lincoln, Rutland, and Northampton Shires,' fol., London, 1727. 2, 'Desiderata Curiosa,' the first volume of which was printed in folio, London, 1732, followed by the second in 1735, both reprinted in 4to. in 1779. 3, 'A Catalogue of all the Discourses written both for and against Popery in the time of King James II.,' 4to., London, 1735. 4, 'New Memoirs of the Life and Poetical Works of Mr. John Milton,' 4to., London, 1740. And 5, 'Memoirs of the Life and Actions of Oliver Cromwell,' 4to., London, 1740. Besides these he published several sermons and poems, and, in 1742, his last work, a volume of religious discourses. He contemplated various other works, some of which appear to have been completed, but none were ever made public. Among his manuscripts, the greater part of which became the property of Sir Thomas Cave, Bart., were five volumes in 4to. fairly transcribed for the press, entitled 'Monasticon Anglicanum' These are now deposited in the British Museum. Mr. Peck concluded a laborious and useful life, July 9, 1743, and was buried in his church of Godeby.

(Nichols *Lit. Anecd. of the Eighteenth Century*, vol. i., p. 507-521; Chalmers's *Biograph. Dic.*, vol. xxiv., 235-240.)

PE'CORA, the name given by Linnæus to his fifth order of MAMMALIA, and thus defined by him in the *Systema Naturæ*:—

Lower *incisors* (dentes primores) numerous; no upper incisors. *Feet* hoofed, bisulcate. *Food* by plucking up (evellendo) plants to be ruminated. Ventricules 4: the *Rumen* for macerating and ruminating; the *Reticulum* cancellated and recipient; the *Omasus* manifolded and consuming; the *Abomasus* banded, ascescent, &c.

In the body of the work the definition is—

No upper *incisors* (*dentes primores*): six or eight lower incisors, very remote from the molars. *Feet* hoofed. *Mammæ* inguinal. The genera composing the order are *Camelus*, *Moschus*, *Cervus*, *Capra*, *Ovis*, and *Bos*. The Pecora stand between the orders *Glires* and *Belluæ*. [RUMINANTS.]

PECQUET, JEAN, was born at Dieppe in 1622. He studied medicine at Montpellier; and while a pupil there, in 1647, he made the discovery, for which he is chiefly celebrated, of the receptaculum chyli and the thoracic duct. [ABSORPTION; LYMPHATICS.] He afterwards went to Paris, and continued his researches on the lymphatic system, and showed that the lacteals do not, as had been imagined, terminate in the absorbent glands, or the liver, or the spleen, but in the receptacle which he had discovered; and that their fluid is thence transmitted by the thoracic duct to the left subclavian vein. His discovery may be said to have put an end to the idea long entertained, that the blood was formed in the liver, and to have added important confirmation of the Harveian account of the circulation. Pecquet died in 1674.

PECTEN (Malacology). [PECTINIDÆ.]

PECTIC ACID. PECTIN. The jelly of certain fruits, as the currant, gooseberry, &c., is distinguished from gelatin, or animal jelly, in containing no azote. Pectic acid was first obtained by Braconnot, so named by him from the Greek *pectis* (πηκτις); and whenever pectin is treated with an alkali, pectic acid is formed. As these substances are intimately connected, they may be considered together.

Pectin may be obtained from many fruits by carefully expressing their juice, and evaporating it at a temperature not above 212°. It may also be procured by adding alcohol to recently expressed currant or gooseberry juice; in a few hours a gelatinous substance separates, which is to be washed with weak alcohol and then dried: in this state it resembles isinglass in appearance, and when immersed in cold water it swells like starch.

Another method has been given for preparing pectin, which is that of mixing the clear expressed juice of currants with that of sour cherries, when pectin falls down; the liquid being poured off, the pectin is to be washed with cold water as long as it comes away coloured.

Hot water has less action upon dry pectin than cold water has: in dilute and boiling alcohol it dissolves slightly; the solution however is not very adhesive. Pectin has no acid properties, nor does it render iodine blue like starch When pectin is treated with nitric acid, it yields oxalic acid and mucic acid, accompanied with a trace of a bitter yellow matter: hydrochloric acid is rendered of a fine red colour by it when they are heated together, and red flakes separate, which are not soluble in ammonia. Pectin has also been found in the bark of most trees.

Pectic acid is obtained whenever carbonate of potash is added to pectin, but carbonate of soda does not produce this effect, nor does ammonia. Lime-water however partially converts pectin into pectic acid.

Pectic acid is perhaps most conveniently obtained from the carrot; for this purpose the rasped root is to be washed with water, and pressed, till it ceases to dissolve anything; then 100 parts of the pressed carrot are to be boiled in water with five parts of bicarbonate of potash; the root is to be again pressed, and the clear solution, which is pectate of potash, is to be decomposed by the addition of a solution of chloride of calcium, which yields by double decomposition an insoluble pectate of lime: this is to be treated with dilute hydrochloric acid, which separates the pectic acid.

Pectic acid has the following properties: it is a colourless jelly, slightly acid, and reddens litmus paper very distinctly. When distilled, it yields a product containing much empyreumatic oil, but no trace whatever of ammonia.

It is very little soluble in water, whether hot or cold, and the filtered solution acts less powerfully on litmus than the gelatinous acid. Although it contains so little of the acid, yet the solution becomes gelatinous when alcohol or sugar is added to it; lime or barytes water also occasions precipitation in it.

When gelatinous pectic acid is gently heated with an excess of caustic potash or soda in a platina crucible, a brown-coloured solution is soon obtained; and when thus evaporated to dryness, the pectic acid is found almost entirely converted into oxalic acid.

The neutral pectates of potash, soda, and ammonia, when dissolved in water, are separated in a gelatinous state from solution by alcohol, sugar, and saline solutions, &c.

Pectic acid is decomposed by sulphuric acid when they are heated together, and nitric acid converts it into mucic oxalic acid, &c. Most of the stronger or mineral acids can decompose the saline compounds of pectic acid; but this is not the case with the greater number of the vegetable acids.

According to Dr. Thomson, pectic acid is composed of—

Eleven equivalents of carbon . .	66
Seven equivalents of hydrogen . .	7
Ten equivalents of oxygen . .	80
Equivalent . .	153

PECTINA'RIA, Lamarck's name for a genus of *Amphitritæ*, Cuvier's fourth family of his *Annélides Tubicoles*, the first order of his *Annelides*. The *Amphitritidæ* of Lamarck form the third family of his division of *Sedentary Annelids*, the others being the *Dorsalidæ*, the *Maldanidæ*, and the *Serpulidæ*. Lamarck's *Amphitritidæ* contain the genera *Pectinaria*, *Sabellaria*, *Terebella*, and *Amphitrite*.

Generic Character.—Body tubular, sub-cylindrical, attenuated posteriorly, having on each side a row of setiferous nipple-like appendages; the filaments short and fasciculated. The anterior part wide, truncate, oblique, with two combs (pectines) of golden spangles (paillettes) which are very brilliant and transverse. Mouth elongated, bilabiated, surrounded with short and numerous tentacles. Four pectinated branchiæ, situated externally on the second and third segment of the body. Tube a reversed cone, membranous or papyraceous, arenaceous, not fixed. (Lam.)

Cuvier states that their intestine, which is very ample and folded upon itself many times, is ordinarily filled with sand.

Locality.—The sea-coasts of temperate and warm climates.

Example, *Pectinaria Belgica*. Seas of Europe.

Lamarck's *Pectinariæ* are the *Amphictenes* of Savigny, the *Chrysodons* of Oken, and the *Cistenes* of Leach, according to Cuvier, who animadverts, not without justice, on these perpetual changes of names, which, he remarks, are likely to end in rendering the study of nomenclature more difficult than that of facts.

PECTINIBRANCHIATA, Cuvier's *sixth* order of Gastropods. The sexes are separate. The respiratory organs consist nearly always of branchiæ composed of *lamellæ* united in the form of combs, and are concealed in a dorsal cavity widely opened above the head. The *Pectinibranchiata* are nearly all furnished with turbinated shells, the aperture of which is sometimes entire, sometimes notched, sometimes canaliculated, and most frequently capable of being more or less closed by an operculum attached to the foot of the animal posteriorly.

This order forms the most numerous division of gastropods, comprehending nearly the whole of the spiral univalves, and many with shells simply conical. Their branchiæ, composed of numerous leaflets or fringes ranged in parallel order like the teeth of a comb, are attached, on one, two, or three lines (according to the genus), to the ceiling (plafond) of the pulmonary cavity, and which opens by a great solution of continuity between the edge of the mantle and the body. Two genera only, *Cyclostoma* and *Helicina*, have, in lieu of branchiæ, a vascular network covering the plafond of a cavity in other respects similar; these are the only genera that respire air directly; all the others respire water.

All the *Pectinibranchiata* have two tentacles, and two eyes, carried sometimes on particular pedicles, and a mouth in the form of a proboscis more or less elongated. The intromittent organ of the male, attached to the right side of the neck, cannot in general be retracted into the body, but is bent back in the branchial cavity, and is sometimes very large. (ENTOMOSTOMATA, vol. ix., *Buccinum*, p. 455.) *Paludina* alone is able to retract it into a special cavity through an orifice pierced at its right tentacle. The rectum and the oviduct of the female creep also along the right side of this cavity, and between them and the branchiæ is a particular organ composed of cellules secreting a very viscous humour, serving to form a common envelope which encloses the eggs, and which the animal deposits with them. The forms of this envelope or nidus are often very complicated and very singular.

Their tongue is armed with small hooks, and wears down the hardest bodies by time and repeated friction.

The greatest difference between these animals consists in the presence or absence of the canal formed by the prolongation of the edge of the pulmonary cavity of the left side, and which is carried out by a similar canal, or by a notch in the shell, to enable the animal to respire without quitting its shelter. There is also this distinction between the genera, that some are without an operculum: the species too differ from each other by the filaments, fringes, and other ornaments which they carry on their head, their foot, or their mantle. (Cuvier.) For an enumeration of the families and genera composing the order, see MALACOLOGY, vol. xiv., p. 317.

PECTI'NIDÆ. Before we enter upon the detail of the genera which it is our intention to notice under this head, it will be necessary to lead the student to an inquiry as to the organization of the forms composing the tribe. A common oyster is within the reach of every one, and a scallop may be procured by most; but till some knowledge of the soft parts contained within the shells is obtained, the observer sees only a gelatinous mass fringed with the gills, or what is vulgarly termed the beard. A general view of the organization of the *Pectinidæ* will be found in the article CONCHIFERA; and we now proceed to a more minute examination of the structure of these Monomyarians.

'Where constant action is not necessary,' remarks John Hunter, in his treatise *On the Blood*, 'muscles alone are employed, as in the greater number of moving parts in most animals; and where any position is required to be constant, and the motion only occasional, from being seldom wanted, there elasticity is alone employed for the purpose of constant position, and muscles for the occasional action. Some bivalves (as the oyster) have a strong muscle passing between the shells for closing them occasionally; but for opening them no muscles are made use of, as this is performed by an elastic ligament in the joint of the two shells, which is squeezed, when shut, by the contraction of the muscle; and when the muscle ceases to contract, the elasticity of the ligament expands it, so that the shell is opened.'

By this simple but beautiful contrivance the open state of the shell, which is necessary for the collection of food and the purposes of respiration, &c., becomes to the animal a condition of repose. In the museum of the Royal College of Surgeons in London (*Physiological Series*) this adaptation is well seen. No. 55 is the longitudinal section of the valves of an oyster, to show the adductor muscle and its antagonist the elastic ligament at the hinge, as above described by Hunter. (*Cat.*, vol. i.)

The following experiment is recorded by Sir Anthony Carlisle. In a pair of fresh oyster-shells, weighing 2465 grains, the entire elastic ligament or spring of the hinge weighed three grains and a half; the elastic power of this spring was equal to the pressure of three pounds fifteen ounces avoirdupois when placed upon the centre of the flat valve, and confined to the area of the insertion of the valvular muscle. (*Hunterian Oration*, 1826.)

No. 673 (of the series in the museum above quoted) exhibits the soft parts of a Scallop (*Pecten maximus*, Linn.), from which the left lobe of the mantle and the corresponding gills and labial tentacles have been removed to show the alimentary canal. The stomach, which is laid open, exposes the apertures by which the bile enters. The intestine may be traced through the projecting mass of ova to the apex of that part, where it suddenly returns upon itself; then winding round the great adductor muscle, it terminates opposite the posterior extremities of the branchiæ. A bristle is inserted in the anus.

The respiratory apparatus, together with other organs, is very well illustrated in No. 959, which exhibits the soft parts of a Scallop (*Pecten maximus*, Linn.) injected. The right mantle-lobe is reflected to expose the branchiæ, which are seen protected by the mantle on the opposite side. The branchial membrane is very delicate in this species, and is supported by numerous slender horny filaments, along which the branchial vessels pass. The branchiæ are placed near the circumference of the shell, and currents of sea-water are perpetually driven over and through them by the ciliary vibrations, aided by the action of the shell and mantle. The large foot of this species is placed between the branchiæ, which are four in number, two on each side. A thick bristle is inserted at the mouth and a smaller one at the opposite side of the digestive canal. No. 960 is a similar injected specimen, but with the right mantle-lobe wholly removed, to show the branchiæ of that side and their supporting membrane. This is broadest at the posterior and of the branchiæ, and terminates in a point anteriorly, where the branchiæ are lost between the two labial membranes. (*Cat.*)

Mr. Garner considers the foot of *Pecten*, &c., to be an organ for the prehension of the food, collected by the vibratile currents near the mouth. It has but one slender muscle. The same author observes that it is evident that in the *Pecten* the labial ganglia are compound; and he states that the excretory organs throw off mucus and colouring matter as well as carbonate of lime, which last is often found in them in the form of concretions; also uric acid. In the *Pecten* a minute orifice leads directly on each side into them. The oviducts likewise enter them. Above, each excretory sac leads into a single transverse cavity under the pericardium. The orifice of the excretory organs is generally near the posterior muscle, and the oviduct more anterior. The ova are discharged into the excretory organs. In the *Oyster* the vessels do not seem to form a gland, but throw off from their extremities distributed to the mantle the calcareous matter to the valves. Garner further observes that those *Lamellibranchiata*, which, like the common mussel, are exposed on the bare rocks to the action of the sun and air, have the valves fitting to each other most exactly, preventing all evaporation. When the valves are open at any part, the animal either inhabits deep water, as many species of *Pecten*, or has the power of burrowing in the mud or sand when left dry by the ebb of the tide.

No. 1388 in the Museum of the Royal College of Surgeons is prepared principally to exhibit the organ of touch. It consists of the soft parts of a *Pecten maximus* minutely injected. The left lobe of the mantle and corresponding branchiæ have been removed, showing the fleshy organ which protrudes from the abdominal surface (the foot). This terminates in an expanded disk, which is an organ of adhesion, and subservient to motion as well as touch. Numerous small tentacles or feelers are arranged along the thickened margin of the mantle; and the sense of touch is further exercised by the highly vascular fimbriated processes which extend from each side of the mouth, and are called the lips. The situation of these lips is indicated by a bristle placed in the mouth. (*Cat*, vol. iii.)

A series of highly-finished figures illustrate the organization of *Pecten* in Mr. Garner's memoir, above alluded to, in the second volume of the 'Transactions of the Zoological Society of London' (pl. xix.). Fig. 1 shows the animal of *Pecten opercularis*, the left valve removed, and the mantle turned up. All the parts are most clearly indicated by the letters of reference, and the eye-specks noticed in the article *Conchifera* are well shown in fig. 1. The stomach, intestine, liver, ovary, &c., of *Pecten maximus* are exhibited in fig. 2. Fig. 3 is one of the ocelli, or eye-specks, found on the margin of the mantle of the same, with its optic nerve magnified; and in fig. 4 all the blood-vessels of *Pecten maximus*, excepting a set of large veins, situated upon the muscle, into which the veins, which are truncated in the figure, enter, are beautifully displayed.

The organization of the oyster is altogether lower than that of the *Pecten*. In the former we miss the well-developed foot, nor is there any trace of eye-specks. 'The shelly case of the oyster,' observes Sir Anthony Carlisle, in his eloquent oration above alluded to, 'is its sole security, and a superior delicacy of touch, diffused over the whole of the living surfaces, warns the creature of every danger, and bids the closing of the senseless valves. The inward organization is equally simple with the exterior forms, and both are suited to a passive life; for locomotive beings demand evidences of distant things,—sometimes to supply their wants, and on other occasions to inform them of danger; but a stationary creature, being doomed to rely on its fixed resources, would only be tantalised by evidences placed beyond its control.' Sir Anthony has described the organization of the soft parts in so lucid a manner, that his description will be understood by any one who feels an interest in the subject, and will follow it with the animal before him. This description we proceed to lay before the reader in the words of the lecturer, as being more adapted to convey clear ideas than any we could substitute.

'The oyster animal,' says Sir Anthony Carlisle, 'is attached to its shells by a very conspicuous mass of muscle and tendinous ligament, which adheres to the centres of the insides of the shells;* and around this middle substance all the other living parts are affixed. Between the muscular ligament and the hinge of the shells, the chief bulk of the body is situate; it occupies the great concavity of the under valve, presenting a squared margin opposite to the hinge, and a projecting margin along its two sides,—the surfaces of the body, which are placed in contact with the shells, present a lace-work of fat, when the animal is in good condition, resembling that of the omentum in quadrupeds. The marginal borders, proceeding alike from the upper and the under surfaces of the body, are gradually extended as they advance toward the edges of the shells,—and they form the outline of those expanded membranes, called the *pallium* or *coverlet* (mantle), which occupy the flatted and larger portions of the shells, and fold over the water-lungs, termed *branchiæ* or *gills*. As there are some parts of the animal and of its shells which differ on the two sides or borders, it becomes necessary to define a *right* and a *left* side. If an oyster be placed with its concave shell downward, and having the hinge next to the observer, the right and left sides will then be determined. The loose folds of the *pallium* become united on the right side, nearly opposite to the muscular ligament,—and they form an entrance to the interior of the *branchiæ*, which may be named the *branchial porch*. When the shells are expanded, the cavity of the branchial tube becomes necessarily dilated, and this occasions a rush of water into all the internal proper branchial vessels, while the outer surfaces of those gills are floated in fresh supplies of water at each opening and closing of the shells. This simple and effective mechanism of these water-bellows is like the other all-wise providings of Omnipotence.'

'At the upper squared end of the body, the marginal borders appear to be glandular, and these, together with a middle follicle, seem appointed to form the elastic ligament or spring of the hinge. The two angles of this end of the oyster are slightly attached to both the upper and under shells, by the upper and under surfaces of these angular extremities; but those adhesions are not muscular, they are merely close contacts, and only occasionally used to make the glandular parts touch the elastic ligament of the hinge. At the upper end of the body, and on its left side, the marginal borders are more extended than upon the opposite or right side, and the top of this border forms a hood over the mouth, where two pairs of leaf like lips are placed, so as to direct the casually presented food into the throat. The marginal borders on the left sides descend to form the *pallium*, and they meet and coalesce with those from the right sides at the *branchial porch*. In the middle, between the folds of the pallium on the right side, and in contact with the central muscle, the terminal intestine descends, and its opening or anus is situate at the entrance of the branchial porch.

'The *branchiæ*, or proper gills, consist of four equal-sized folds, enclosed by the pallium. These branchiæ extend from between the palpi, or lips of the mouth, on the left side, to the junctions of the pallium, on the right side, where it forms the branchial porch. The roots of these gills are joined to the insertions of the pallium, where its two folds adhere to the central tendon, and by this structure a large branchial cavity is formed, into which the smaller branchial tubes open by four distinct rows of holes, each of them allotted to one plait of the gills. When any liquid is forced into the branchial cavity, it spirts out at numerous distinct pores along the convex edges of the gills, and these pores severally correspond with the single tube assigned to each plait of the branchiæ,—so that the inspired water passes from the branchial cavity straight through the tubes of the gills into the open space between the folds of the pallium, without returning. This water respiration is probably a chemical action upon the elements of water itself, and not an abstraction of air, because oysters and such-like animals often reside at extreme depths in the sea, where the pressure upon gaseous matter would be a physical obstacle.'

'The heart of the oyster is seated within a free space which is bounded by an arch of the body, formed between the great valvular muscle and the mass which is occupied by the liver and stomach. Two remarkable circumstances belong to this heart:—its contained fluid or blood does not coagulate spontaneously, and it holds in solution the same proportion of sea salt with the surrounding water. The muscular flesh of the ventricle of the heart is soft and tender, like that of an incubated chick in its first stage. The auricles are of a black colour throughout their tissues,

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* See *ante*.

—a peculiarity not easy to be explained. The arterial and venous systems resemble those of the whole tribe of molluscous *Acephala*, but the singularities of each species are difficult to be traced, because the vessels are too delicate to admit gross injections, and those of more refined composition are apt to pass out of the vascular tubes, and by extravasation to spoil their distinctness.

'Within the body are the stomach and liver, occupying its principal bulk. The stomach consists of a sinuous cavity, subdivided by alternate projections and clefts, adapted to each other, and in those spaces I have generally found a detached piece of cartilage, whose office may be that of assisting in the trituration of the food, because the interior of the stomach itself presents similar cartilaginous projections. The intestine is a simple tube coiled round the stomach and the liver; it begins at the lower and left end of the stomach, and terminates at the branchial porch; it is tinged with amber coloured bile throughout its course. The liver is the most conspicuous and the largest of all the glandular organs assigned to this tribe of animals; it everywhere surrounds the stomach, and by obvious pores discharges its bile into every space of that cavity, colouring the contents of an umber-brown hue. Externally, the liver exhibits a regular series of equal-sized granules, which may be shown by boiling the animal, and then tearing off its loosened exterior covering. The inward structure presents arborescent vessels which converge into the secretory ducts as they approach the stomach. It is worthy of notice, that the minute vessels of the liver, in all these creatures assume an acinated or grape-like figure, similar to that which is common to all the higher orders of animals. Both the surface of the animal in contact with the concave and that in contact with the flat shell present similar parts, and the cavity for lodging the heart is equally exposed to the inner surface of each shell. A cone-shaped extension of the body winds along the left side of the muscular ligament; it has a tubular cavity, which communicates with the alimentary passages; it resembles the reproductive parts in the scallop and is an obscure likeness of the *foot* in some other *Acephala*.'

'Oysters are considered to be perfectly androgynous. . . . They are viviparous, and their young are found within the branchial passages, and between the folds of the coverlet, during the months of June and July, in this climate.* In the first state the oyster exhibits two semiorbicular films of transparent shell, which are constantly opening and closing at regular intervals. The whole brood are associated together, by being involved in a viscid slime, and in that state called "*The Spat*." It being common among viviparous animals of this kind to have their spawn posited in contact with the lungs, the involving slime serves as the first nutriment, and we may infer that the fœtal food, so influenced by the gills, is at the same time a respiratory supply to the imperfectly formed young.'

'The *brain* or substance principally concerned with sensibility is small in proportion to the bulk of an oyster. It consists of two minute detached nodules or ganglions, each having a few slender nervous fibrils passing in radii to the neighbouring parts; the largest ganglion is affixed to the gullet, showing that the chief preserving sense is given to test the articles of food.'

Sir Anthony Carlisle further informs us that the body of the oyster is entirely covered by one continuous membrane, which extends to the margins of the pallium, and embraces within its folds all the vessels and parts belonging to that apparatus. Several transparent arborescent blood-vessels are placed between this outer membrane and the substances of the body, and on the palpi or lips. The marginal borders of the pallium are not attached to the shells, but they occupy the whole range of their inner circumferences, and are moveable towards the edges of the shells or retractible at discretion. Two arrangements of muscle appear along the loose borders of the pallium; one set of muscular fibres form a longitudinal band of several lines in breadth, and this serves to gather up and shorten the outline of the pallium when it is retracted; the other is a series of muscles passing from the margin and radiating towards the great central muscle.

'The muscular parts of these radiated muscles,' continues Sir Anthony, 'extend a few lines within those of the longitudinal bands; they are obviously retractors, or opponents to the marginal protrusions of the pallium,—and each bundle of these muscles is attached to a small tendon. These tendons form a lace-work by lateral junctions with each other, until the whole are collected into two principal cords, which are converged together, and finally inserted into the left sides of the central muscular ligament. This plexus of tendons resembles that of the extensors of the human fingers, but their subdivisions in the oyster consist of several series, and those which are joined to the muscles are exceedingly multiplied. From observing the living oyster, it is evident that these radiated muscles are excited to contract, when touched, and that each stimulated part hauls up a tuck of the border of the pallium, and by a continuity with adjacent tendons, every touched point moves and excites similar neighbouring and allied muscles, so as to withdraw a larger portion of the pallium from annoyance. The use of all these arrangements appears to be for the protection of the living animal, since the irritable muscular borders of the pallium are not only adapted to withdraw *themselves* from hurtful impressions, but by pulling the associated tendons against the central muscle, *it* becomes likewise excited, and immediately closes the valves.'

'Along the borders of each fold of the pallium, and projecting from both edges of their margins, are two rows of papillæ, which are sometimes to be seen distended with water, and at other times they are collapsed into a fringe-like substance. In the distended state, these papillæ, or nipples, often eject water from a pore at the point of each, and then collapse. The *mesenteric portions* of the pallium are fixed to the central muscle and tendon; they each consist of two plates of the general investing membrane, and they embrace the tendons of the radiated marginal muscles. Between these membranous plates there are non-adhering spaces, like those between the *pia* and *dura mater* of the human brain, and from being occasionally found distended with water, they have been, as *I believe, falsely* called "*absorbing* vessels." These spaces appear to be truly cellular, and not continuous tubes, for they communicate with each other laterally, and thus resemble the tubular cells of the *corpus spongiosum penis*, just before they are converted into veins. The use of the cellular structure of these mesenteric membranes is, to protrude the margins of the pallium by the force and direction of injected water; for when the mesentery of the pallium is so distended, the fringed borders are pushed to the margins of the shells. This action is more directly manifested in the syphon of the *Pholas Dactylus*. A dingy green colouring matter appears irregularly dispersed through the larger convex ranges of the *fimbriæ*, and it appears to be the same as the tinging substance of the scales belonging to the upper or flat shell. Papillæ exactly similar to those of the oyster may be seen in the syphons of *Pholades*, in the *fresh-water mussel*, in *Actiniæ*, and in several other *mollusca*. The outer surfaces of the pallium are occasionally found adhering, at uncertain places, to the inside of the shells; but this adhesion depends wholly upon close contact, and it only happens where the shell is undergoing repair, or where it is augmenting; in no instance does the substance of the pallium mingle with the shelly materials. [SHELL.]

PECTENS.

Pecten. (Lamarck.)

Animal subrotund, not thick; lobes of the mantle very delicate, disunited throughout, thickened on the borders, and furnished with many rows of fleshy cilia, between which are regularly disposed a series of smooth sessile tubercles; branchiæ large, decomposed into detached filaments; the small foot dilated at its extremity; mouth rather large, oval, surrounded with projecting and deeply cut lips, and furnished on each side with a pair of triangular palpi truncated at their extremity. (Deshayes.)

Generic Character.—*Shell* free, regular, inequivalve, auriculated; lower margin transverse, straight; umbones contiguous. *Hinge* toothless; cardinal pit entirely internal, trigonal, and receiving the ligament. (Lam.)

Geographical Distribution.—The Pectens are widely diffused, and species are to be found in the seas of most climates. Though there is a general similitude in the shells of all the numerous species which at once shows to what genus the animal belongs, the varieties of form and colour are infinite, and the species are in many instances very difficult to be defined, though the eye of an acute observer will at once determine differences which the pen cannot convey without some difficulty, if it succeed in making the differences understood at all. The colours of some are most vivid and beautifully variegated, whilst those of others again are sombre. The shells of some are stout and heavy, of others light, and some are nearly as transparent as glass (*Pecten vitreus*, Gray,* and *Pecten vitreus*, King, for example). The depths at which they have been hitherto found range from the surface to twenty fathoms. *Pecten vitreus* (King), which occurred everywhere in the Strait of Magalhaens, was found attached to the leaves of *Fucus giganteus*, and formed, with other mollusks, the food of the steamer or racehorse duck (*Micropteri brachypterus* and *Patachonicus*). The bottoms haunted by the Pectens have been found to be sands, sandy mud, and mud.

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* Sir Anthony remarks that it is questionable whether any animal possesses [illegible]

Utility to Man.—As an article of food the genus is generally useful. On our own southern coasts, where the sea is prodigal of its contributions to the table, Pectens are considered a delicacy, and when well treated by a good cook make a rich and sapid dish, as might be expected from the name of them when so prepared, 'Quins.' The St. James's Cockle Shell, *Pecten Jacobæus*, was formerly the badge of the pilgrim who had been to the Holy Land.

Linnæus separated this extensive genus, that is, the Pectens properly so called, into three sections:—1. The auriculated equilateral Pectens. 2. The Pectens with one auricle ciliato spinous within. 3. (Including Lima) Pectens with their valves more gibbous on one side than on the other. Of the first of these, *Pecten Jacobæus* and *Pecten Pleuronectes* are examples; of the second, *Pecten Pallium*, the well known Ducal Mantle of collectors; and of the third, *Pectines flavicans* and *fasciata*, Linn.

Lamarck divided the genus into two sections only:—the first containing the species with the auricles equal or nearly equal; the second consisting of those which have the auricles unequal. The species cited as examples of the first and second divisions of Linnæus will serve as illustrations of this arrangement.

M. de Blainville separates the Pectens into four subdivisions:—1. (*Les Pelerines*) those species which are very inequivalve; the left valve being very flat (*Pecten Jacobæus*, &c.). 2. (*Les Soles*) Equivalve species which do not gape (*Pecten Pleuronectes*). 3. Species whose two valves are nearly equally concave, but the right rather the least, and having its inferior auricle less wide than that of the left, so as to produce a sort of notch, for the passage of the byssus, as he thinks (*Pectines gibbus* and *glaber*). 4. Species with striæ parallel to their border (*P. orbicularis*, fossil).

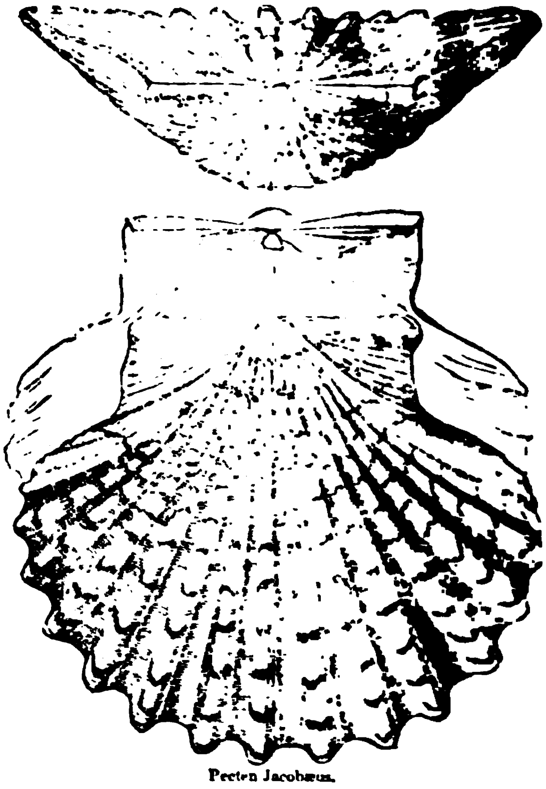
Mr. G. B. Sowerby makes the divisions five:—1. Both valves convex, equal or nearly in size (*Pecten turgidus*). 2. One valve flat, the other deep or convex (*P. Jacobæus*). 3. Both valves rather convex, not meeting all round (*P. Pleuronectes*). 4. Both valves convex, but unequal in size (*Pectines bifrons* and *aurantiacus*). 5. Irregular, apparently adherent by the outside, but only taking the form of whatever it is attached to in consequence of being close pressed to it (*Pecten Pusio*, Hinnites).

The same author states his belief that all the Pectens are attached by a byssus, although it is seldom observed, even in the living specimens. He accounts for this circumstance however by supposing that their attachment by the byssus is very slight, and he relates that he has seen them attaching their threads by means of their small and slender foot. Many of the Pectens, he adds, have a row of small sharp teeth on that side of the shell under the ear which forms a part of the sinus for the byssus. He had in a previous number of his *Genera* stated his certainty that *Lima* is attached by a byssus, but, as far as he could ascertain, *Pecten* is not. (See *Lima*, post.)

The following examples will illustrate the genus:—

Pecten Jacobæus.—Shell inequivalve, rather flattened above, with from fourteen to sixteen angulated rays; those of the lower valve longitudinally sulcated. Often agreeably variegated.

Locality.—The seas of Europe. (Fossil in Italy.)

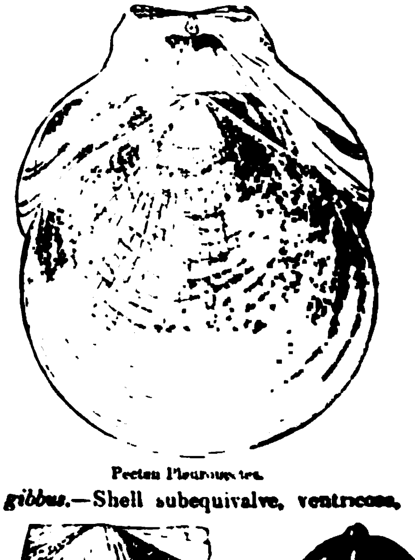


Pecten Jacobæus.

Pecten Pleuronectes.—Shell subequivalve, rather thin, smooth externally, somewhat convex on both sides.

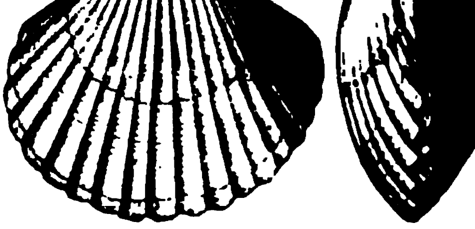
This species has the upper valve always coloured, generally reddish or rich reddish brown, and the lower one white, whence its name. In the inside of the valves are projecting, radiated, somewhat distant ribs.

Locality.—East Indian Seas. (Fossil in France, at St. Paul Trois Châteaux, department of Drome.)



Pecten Pleuronectes.

Pecten gibbus.—Shell subequivalve, ventricose, turgid.



Pecten Gibbus.

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* Mr Gray's *Pecten vitreus*, which has the priority, was published in the Appendix to Captain Parry's 'Voyage' (1824), among the animals which were found within the Arctic Circle. It is smooth, and different from Captain King's *P. vitreus*.

rib, with from 20 to 22 radiating rays, which are somewhat ragged at their sides and interstices.

Locality.—The Atlantic and American oceans.

Pecten orbicularis.—Shell suborbicular, depressed, rather convex, with transverse concentric striæ on one valve, the other valve smooth; no rays. (Fossil: England—Wiltshire, Devizes; Sussex, chalk formation; France—[illegible], near Mans. Approaching *Pecten [illegible]*.)

Pecten [illegible].

The recent species are many, and the fossil species are probably more than the recent.

Fossil Pectens.

M. Deshayes, in his Tables, gives the number of living species as 51, and that of the fossil (tertiary) as 89; of which *Pectines Jacobæus, Laurentii, Pleuronectes, opercularis, [illegible], varius, ornatus, [illegible], [illegible], [illegible], Pusio* and *[illegible]*, are recorded by him as species found both living and fossil (tertiary). The form is found fossil in most of the strata from the crag to the oolitic series inclusive.

The number of recent species, including that which belongs to the genus *Hinnites* given in Deshayes's edition of Lamarck, is only 51, and that of the species fossil only is [illegible]. These numbers appear to be below the mark, allowing for varieties recorded as species (such as *P. Pusio*, Lam., which that zoologist considers to be only an impoverished variety of *P. varius*), for some recent species (*P. vitreus*, Gray, *P. [illegible]*, King, and *P. [illegible]*, Desh., and eight species recorded by Mr. G. B. Sowerby from Mr. Cuming's collection in *Zool. Proc.*, 1835, for example) are not inserted. Then of fossil species we find, for instance, no mention of *Pecten [illegible]* or *P. Lyelli* (Lea), nor of *P. [illegible]*, *P. Milleri*, and *P. Murchisonianus*, noted in Dr. Fitton's *Systematic and Stratigraphical List of Fossils* (below the chalk), and figured in his excellent memoir.* For fossil species, the reader is further referred to *Min. Conch.*; Mantell's *Tabular Arrangement of the Organic Remains of the County of Sussex* ('Geol. Trans.,' vol. iii., 2nd series); Phillips's *Illustrations of the Geology of Yorkshire*; and Lonsdale's memoir *On the Oolitic District of Bath* ('Geol. Trans.,' vol. iii., 2nd series); Lea's *Contributions to Geology*; Von Buch's *Pétrifications Recueillies en Amérique* (fol., Berlin, 1839); and the works of Knorr and Goldfuss.

HINNITES. (Defrance.)

Mr. G. B. Sowerby, in his paper on *Hinnites*, in the 'Zoological Journal' (vol. iv.), says, 'The examination of a number of specimens of three or four decidedly congenerous species have conducted me to the results which will be explained in the following observations.—First I must inform naturalists that one of our commonest British shells, to which neither M. Defrance nor Mr. Gray has referred, belongs to this genus, namely, *Pecten Pusio* of some, *P. distortus* of others. The singular manner in which this shell almost constantly becomes pressed in and takes the shape of the substances to which it adheres, and the extremely rare occurrence of an opportunity of observing its byssus, may have given rise to the idea of its being adherent by its outer surface to those substances, whereas the contrary is really the case, as is proved by the very young specimens which never have any appearance of adherent outer surface. The [illegible] in the shell called *Hinnites* by M. Defrance (Mr. Gray's [illegible] of it) has undoubtedly been the cause of leading him to describe them as adherent by their valve [illegible] and not by a byssus,' &c. Mr. Sowerby then proposes an amended generic character for *Hinnites*, [illegible] in which he describes the shell [illegible], and gives a list of five species, *Hinnites Pusio* (*Pecten Pusio*, *P. distortus* of some) being the last. The same author, in his *Genera*, speaking of *H. Pusio*, says, 'Irregular, apparently adherent by the outside, but only taking the form of whatever it is attached to in consequence of being close pressed to it. This has generally been thought to belong to the *Spondylidæ*, and has been named *Hinnites* by Defrance. We have however proved it to be a *Pecten*. See *Zool. Journ.*'

M. Rang notices *Hinnites* as fossil only.

M. Deshayes, in his last edition of Lamarck, thus defines the genus:—

Animal unknown.

Shell oval, irregular, adhering by the right valve, inequivalve, subequilateral, perfectly closed; its upper part terminated on each side by auricles similar to those of Pectens; cardinal border straight, toothless, prolonged with age into a small heel (talon); ligament thick, contained in a narrow and very deep gutter (gouttière).

M. Deshayes then proceeds to observe that the genus *Hinnites* forms one of the intermediate links serving to connect the *Pectens* to the *Spondyli* and *Oysters*, but that it has more analogy with the last than with any others of the same family. The shells forming the genus are, he says, irregular, inequivalve, and adherent by the right valve, which is generally larger and deeper than the other. Its summit (crochet) is sufficiently regular, which indicates that in its youth the shell has more regularity. The greater part of the lower surface is very irregular, and exhibits a large adhering surface. The upper valve is flattened, more regular, and presents striæ or longitudinal furrows, which are more or less numerous and scaly according to the species. The hinge is nearly similar to that of the Pectens; it is accompanied on each side by short ears, which are nearly equal and very close, *so as to leave no passage for a byssus*. The cardinal border is straight, thicker than in the Pectens; the gutter of the ligament is much narrower, much deeper, and more prolonged superiorly, which gives it some resemblance to that of *Pedum*; in age the cardinal border offers a plane oblique surface, comparable to that of *Pedum* and *Spondylus*, and which is not remarked in the *Pectens*. The muscular impression is very large and rounded, and the pallial impression, as in *Spondylus*, is very much approximated to it. A small number of species only belonging to the genus is as yet known, and a single living species (*Hinnites sinuosus*, Desh.; *Pecten sinuosus*, Lam.; *P. Pusio*, Pennant, Sow.; *Ostrea sinuosa*, Gmel., Maton, and Rackett) has been recorded.

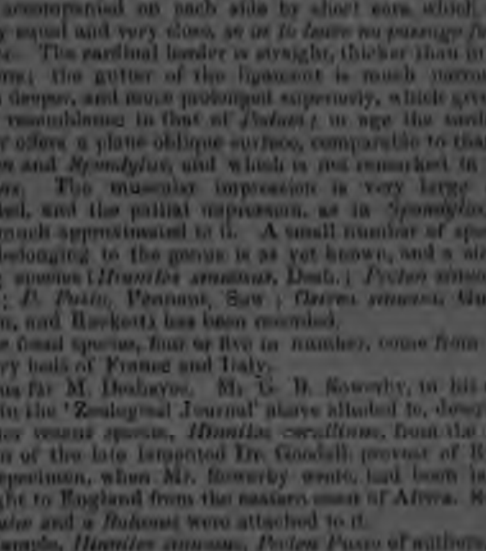
The fossil species, four or five in number, come from the tertiary beds of France and Italy.

Thus far M. Deshayes. Mr. G. B. Sowerby, in his memoir in the 'Zoological Journal' above alluded to, describes another recent species, *Hinnites corallinus*, from the collection of the late lamented Dr. Goodall, provost of Eton. The specimen, when Mr. Sowerby wrote, had been lately brought to England from the eastern coast of Africa. Some *Serpulæ* and a *Balanus* were attached to it.

Example, *Hinnites sinuosus*, *Pecten Pusio* of authors.

Description.—*Shell* ovate, unequally sinuous, variegated with brownish orange and white, and marked with numerous very narrow, striæform, and scaleous rays.

Locality.—The British Ocean and British Channel.



Hinnites sinuosus:
a, outside of under valve.

Lima. (Brug.)

Generic Character.—Animal oval, having the lobes of the mantle separated nearly throughout their extent, larger than the valves of the shell, and turned towards the [illegible] as a [illegible]; this part of the border is wide, and furnished throughout its extent with numerous tentacular, elongated, and annulated cirrhi. *Branchiæ* rather large, equal, and separated (écartées); foot cylindrical, vermiform, rather club-shaped, and terminating in a small sucker (ventouse), by means of which the animal can fix itself to submarine bodies; *no byssus;* buccal aperture oval, furnished with large foliaceous lips, terminated on each side by triangular and obliquely truncated labial palps. (Deshayes.)

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* 'Observations on some of the strata between the Chalk and Oxford Oolite in the south-east of England,' by William Henry Fitton, M.D., F.R.S., &c. ('Geol. Trans.,' vol. iv., 2nd series.)

Shell longitudinal, subequivalve, auriculated, rather gaping on one side of the valves; umbones distant (écartées), their internal facets inclined inwards. Hinge toothless. Cardinal pit partly external, receiving the ligament.

Among the observations of Lamarck on this genus, we find him remarking that here the peculiar notch on the lower valve is no longer to be found; a simple separation (écartement) between the valves gives place to a sufficient lateral opening, and the pit which receives the ligament is become wider and more internal. Thus the *Limæ* have necessarily a great relationship to the *Pectens*, whence many authors have confounded them in the same genus. Linnæus, considering only the want of cardinal teeth in these shells, arranged them among his oysters; but their free regular and nearly equivalve shell requires their separation from the oysters, as the separated umbones and the cardinal pit of the *Limæ* make it necessary to distinguish them, as Bruguière did, from the Pectens.

Lamarck concludes by noticing their colour, which is nearly always white, and by observing that the animal seems to be furnished with a foot fitted for spinning a byssus.

M. Deshayes, in the last edition of Lamarck, states his opinion that *Lima* is a genus which well deserved to be separated from its congeners in the family of *Pectinidæ*. Not only, says M. Deshayes, has it no byssus, but its mantle, like the shell, gapes much, and the large re entering edge of the former is furnished with a great number of vermiform flexible tentacula, which seem formed, like the antennæ of insects, of gradually decreasing articulations. Between these tentacles there are no tubercles with smooth surfaces similar to those of the *Pectens*, the *Spondyli*, and the *Pedu*. The foot has a particular form, recalling to the observer that of *Lucina* or *Loripes;* it is elongated, narrow, cylindrical, and rather thickened at its free extremity, where it terminates in a sort of sucker, which, according to the observations of M. Quoy, serves to fix the animal upon solid bodies even of the most smooth surface. The mouth is placed between two lips comparable to those of *Pinna;* they are foliaceous, descend upon the lateral parts of the body, and terminate on each side in a pair of labial palps, which are truncated and triangular. The branchiæ are rather large and equal. Those on one side are separated from those on the other by a rather wide space, in which may be easily perceived the adductor muscle, on the posterior face of which the anus terminates. This muscle seems more extensible than in the greater part of the mollusks of the same class. When it is not contracted, the valves are widely opened, and the animal has the power of impressing on it frequent and sudden contractions, the rapidity of which is facilitated by the extreme elasticity of the ligament of the valves. By means of these reiterated contractions the animal can flutter in the water, to use the happy expression of M. Quoy, and one must run after it to catch it among the corals or in the shallows where it dwells. M. Deshayes concludes that from this remarkable union of characters it might be possible for zoologists to decide upon forming of this genus a small family distinct from the Pectens, but placed in their neighbourhood.

The power of fluttering through the water is possessed by some of the Pectens, perhaps all. [CONCHIFERA, vol. vii., p. 433.] With regard to the absence of byssus, Dr. Turton, some years ago (1826), in his description of *Lima tenera*, remarked that he had dredged up half a dozen living specimens of various sizes in the British Channel, and stated that they had no byssus attached to them, nor had *Lima Loscombi* when taken alive.

Geographical Distribution.—This form is widely distributed, and is generally found in the seas of warm and temperate climates, where it has been taken at depths ranging from the surface to thirty fathoms.

Mr. Garner remarks that in the heart of *Lima* there are two ventricles, the rectum passing between them.

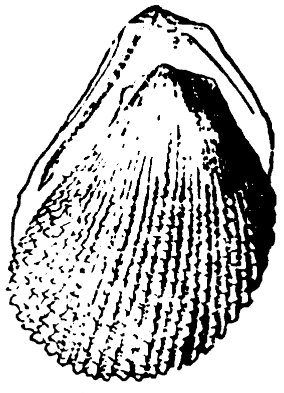
The recent species are not numerous. M. Deshayes, in his Tables, gives the number as 8. In his last edition of Lamarck, the number of recent species is only 6, but this seems to be below the mark; for instance, neither *Lima tenera* (Turton) nor *Lima Loscombi* is there noticed. *Lima tenera* (Chemn.) is quoted as a variety of *L. glacialis.*

Example, *Lima squamosa.*

Shell oval, depressed, clipped as it were anteriorly, white; ribs squamous, rough as a file; hinge oblique, margin crenated.

Locality.—Seas of America.

There is a variety which has the scales less numerous.



Lima squamosa.

Fossil Limæ.

The number of fossil species noted in the tables of M. Deshayes are 13 (tertiary), and the following species are recorded as living and tertiary, *Limæ inflata, squamosa, lingulata,* and *nivea*. In the last edition of Lamarck the number is 18. This seems to be too small. Neither *Lima semisulcata* nor *L. subovalis*, for instance, figured in Dr. F[illegible] memoir above alluded to, from Blackdown, appears among the species.

We are not aware of any *Limæ* found below the lias, though the form occurs in it (ex. *L. antiquata**) and in the inferior oolite; nor do we know of any recorded from the London clay, though some occur in the calcaire grossier and in the corresponding Italian beds.

Pedum. (Lam.)

Generic Character.—Animal oval, oblong, flattened, having the lobes of the mantle open throughout their circumference, thickened on their edges, and furnished on [illegible] part with many rows of tentacular cirrhi, and, at regular distances, tubercles with smooth surfaces. A pair of [illegible] branchiæ descending on each side to the edge of the lower border of the mantle; abdominal mass small, having anteriorly and high up a small vermiform foot, and at its base a silky *byssus* of some size; mouth oval, having on each side a pair of labial triangular palps. (Deshayes.)

Shell inequivalve, subauriculate, lower valve gaping; umbones unequal and distant. *Hinge* toothless; ligament partly external, inserted in an elongated canaliform pit which is hollowed out in the internal wall of the umbones. Lower valve notched near its posterior base. (Lam.)

The animal is described and figured by MM. Quoy and Gaimard, in the 'Zoology' of the *Voyage of the Astrolabe*, and has, as M. Deshayes observes, much analogy to that of the *Pectens* and *Spondyli*. According to MM. Quoy and Gaimard, the form is assimilated to that of the shell. The lobes of the mantle are separated throughout their circumference, except in the width of the upper border, which is very short; the edges are thickened and furnished with a great number of fine unequal tentacles, between which appear, at equal distances, small smooth tubercles, similar to those described by Poli and others in the *Pectens* and *Spondyli*. The branchiæ are large, nearly equal, and descend between the lower borders of the mantle; those of the one side are separated from those of the other by a flattened space, which is rather wide, and forms the anterior and lower part of the body of the animal. At the lower part of this space is seen a small vermiform foot, at the base of which is a rather large yellowish byssus, which is silky and has a nacreous appearance. Behind the foot is the mouth, which is oval, and furnished on each side with a pair of triangular short palps, fixed by one of the sides of the triangle and free otherwise; they are striated like the branchiæ which they touch. The mantle on the right side presents at its superior and anterior part a notch in conformity with that of the shell for the passage of the byssus. The single adductor muscle is placed towards the upper and posterior part of the animal, the anus passes behind it, and terminates at the summit of a small appendage floating between the branchiæ.

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* Not mentioned in the last edition of Lamarck.

The only example known is *Pedum Spondyloideum*.

Description.—*Shell* ovato-cuneiform, pinnulate; whitish tinged with red or purplish, especially near the umbones; the upper valve flat and striated longitudinally; the lower valve largest, with the lateral edges turned up and raised above those of the upper valve.

There is a smaller variety, much more round, and generally more delicate.

Locality.—East Indian Seas (Isle of *France*, &c.). MM. Quoy and Gaimard found the species at the island of Vanikoro, where it was abundant, living partially encased in Madrepores, especially *Astreæ*. M. Quoy is of opinion that it is capable of hollowing out the holes in which it is found for itself; and he found young and old individuals burrowed in the same mass of Madrepore proportionally to their size. M. Deshayes suggests whether the animal having first attached itself to the coral, the growth of the latter may not partially envelop the shell.

Shell of Pedum Spondyloideum.

Plicatula, *Spondylus*, &c. will be treated of under the title SPONDYLIDÆ. We now shall draw the attention of the reader to those more rough forms, most of which Linnæus included in his fourth section.

OYSTERS.

Gryphæa (Lam.), fossil principally.
Exogyra (Say), fossil only.

These two genera are so established in fossil catalogues, that it may be convenient to retain their names; but we agree with Mr. G. B. Sowerby and M. Deshayes, that, physiologically considered, they ought to be abandoned. Mr. Sowerby, in his 'Genera,' remarks that the particular points upon which Lamarck depends for his distinction between the Oysters and *Gryphææ* are, 1st, the apparent regularity of the latter; 2nd, their being scarcely if at all attached; and 3rd, the generally large, involute, spiral umbo of the lower valve. To the first Mr. Sowerby answers, that though the *Gryphææ* are in general apparently more regular than the *Ostreæ*, they cannot be considered as regular shells, and that they are moreover very variable; secondly, the *Gryphææ*, as well as all other *Ostreæ*, are attached by the umbo of the larger and convex valve, and this particularly in the young state (in which state in fact it is impossible to distinguish between one and the other); moreover both become free as they advance in size; and if the *Gryphææ* are thus apparently more regular, it is because in their young state they have lived in situations where they could only become attached to small regular objects, while the *Ostreæ*, having lived in more rugged and irregular situations, and consequently remaining attached for a longer time, have partaken more of the regularity of their native situation. 'Indeed,' adds Mr. Sowerby, 'there is sufficient evidence that an oyster, when by any chance it becomes attached to a small smooth object, where it is comparatively free, becomes also regular in the same degree: thirdly, we cannot approve of the term *spiral* as at any time applicable to the umbo of the lower valve of the *Gryphææ*; when young, it is not *involute*; and though Lamarck mentions the size of this as one important distinguishing mark of his genus, he gives the characters of several species in which this part is *small*. Another circumstance in which the *Gryphæa* is thought to differ from *Ostrea* has been dwelt upon by some, an obscure lobe or sulcus observable on the right side, particularly of the lower valve; but this is far from being distinct in some species.'

M. Deshayes observes, in the last edition of Lamarck, that if we study the oysters with attention, the first thing that strikes us is that the species are very variable in form. If a large assemblage be collected, some individuals of these variable species will be almost always found whose umbo is fashioned according to the manner in which the shell is attached, so as to be turned either laterally or upwards, as in *Gryphæa*. Thus it may be said that the greater part of the species of oysters have their gryphoid varieties. If a rigorous application of the characters of *Gryphæa* be made to these varieties, they may be comprehended in that genus, whilst the others may remain among the oysters. Between the *Gryphææ* and the oysters the passage is insensible, and in a large series of species and varieties it would be impossible rationally to draw the line between the two genera. Indeed, the difficulty of drawing this line is increased when we perceive all the forms of both genera in the same species. M. Deshayes goes on to notice the observation of Lamarck, that in the *Gryphææ* the shell is free: this, says M. Deshayes, is an error; there are *Gryphææ* which affixed themselves to solid bodies, like the oysters, and there remained during the whole of their existence; all the others were fixed for a longer or shorter period in their youth only, and only became free as they advanced in age. This observation will apply equally to many species of oysters, and particularly those which live on muddy or sandy bottoms. In the oysters, as well as in the *Gryphææ*, the valves are unequal, and in both genera the left valve is always largest. The involute spiral curvature of the umbo of *Gryphæa* is perhaps the strongest point of distinction, and it certainly is constant in many species; but in all it is not. In this respect the variations are comparable to those in the oysters: if the involution exists in the *Gryphoid oysters*, it exists also in the Ostreiform *Gryphææ*. The hinge and muscular impression in both *Ostrea* and *Gryphæa* are so similar, that M. Deshayes expresses his surprise that Lamarck could be induced to establish so useless a genus.

But if the generic claims of *Gryphæa* be untenable, those of *Exogyra*, established by Say for the reception of the *Gryphææ*, whose umbo, instead of rising above the valves, take a lateral direction, have still less foundation. There is not, says M. Deshayes in conclusion, a single character which is not to be found in the oysters, and sometimes in the varieties of the same species. (See further, *Ostrea*, post.)

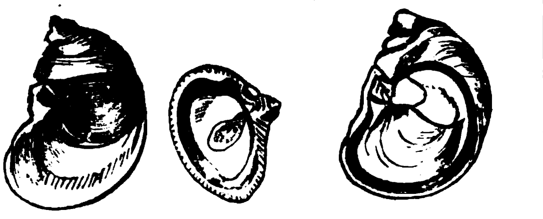
Geological Position.—Gryphææ are found in almost all the strata down to the lias (inclusive).

The so-called species are numerous. Thirty-four are enumerated by M. Deshayes in his last edition of Lamarck, and of these only one, *Gryphæa angulata*, is recent. In the Tables of M. Deshayes, the number of living species consists of this unit, and of fossil (tertiary) three species.

Gryphæa incurva (Lam.)

are there recorded. The reader may consult the catalogues above noticed for fossil species and localities.

Exogyra is included in the species of *Gryphææ* noticed in the last edition of Lamarck. Von Buch has recently published a fine species under the name of *Exog. polygona*, from Montan (South America), where it was found in company with Pectens by M. Alexandre de Humboldt.



Exogyra conica (Upper Green-Sand, Gault, Lower Green-Sand, Blackdown).

Ostrea. (Linn.)

Generic Character.—Animal oval, oblong, flattened, often irregular; lobes of the mantle thick and fringed on the borders, separated throughout their extent; no foot; mouth moderately furnished with two pair of elongated lanceolate palps; branchiæ large, curved, nearly equal. The non-symmetrical heart not having its basis upon the intestine, which last terminates behind the adductor muscle by an anus which floats between the lobes of the mantle. (Deshayes.)

Shell adherent, inequivalve, irregular; umbones distant, and becoming very irregular as the animal advances in age; upper valve smallest, gradually displacing itself, and advancing forwards as the animal grows older. *Hinge* toothless; ligament demi-internal, inserted in the cardinal pit of the valves; the pit of the lower valve increasing with the age of the animal, as well as the umbo, and acquiring sometimes a great length.

Geographical Distribution.—Very wide, and principally in the seas of temperate and warm climates: no species appear to have been met with in the Polar expeditions very far north. Oysters have been taken on gravel and sand, in æstuaries, and on the sea-coast, sometimes attached to rocks, trees,[*] &c., at depths varying from the surface to 17 fathoms. In the British Museum there is a good sized crab, on the back and claws of which are many oysters. [Crab, vol. viii., p. 126.]

It is impossible not to hold in the greatest respect the opinions of so distinguished a geologist and naturalist as Von Buch, and when we find him up to the present time (for in his *Pétrifications Recueillies en Amérique*, folio, 1839, above alluded to, he still insists on the distinction) separating the *Exogyræ* from the *Gryphææ* and the *Oysters*, it becomes necessary that reasons to which his name must give deserved weight should be critically examined. In the 'Annales des Sciences Naturelles' (May, 1835), Von Buch says, 'Les Huitres ont une tendance à s'isoler sur un plan droit, les Gryphées sont profondes, et les Exogyres ont une tendance marquée à former une carène.' This, observes M. Deshayes, is true as a general proposition; but it wants exactness when one comes to examine in detail a great number of individuals of the species. If the oysters in general have a tendency to extend themselves, nearly all take different shapes according to the form and extent of the body on which they fix themselves; and indeed M. Deshayes, in his work on the fossil shells of the environs of Paris, has made it appear that in a single species is found nearly all the forms belonging to the oysters properly so called, to the *Gryphææ*, and to the *Exogyræ*. 'If,' observes M. Deshayes, 'we take the best characterised species in the group of *Gryphææ*, we find them variable, and if we compare the young individuals with the young of oysters, we find no difference. Take as the point of departure *Gryphæa arcuata*, a species the umbo of whose lower valve is the most elevated, and we shall find an insensible passage to the oysters properly so called, established by many species in which this part, becoming less and less projecting, finishes at last by disappearing in this form to take that of the oysters; this transition is so insensible, that we regard the rational limit of the two genera as impossible. M. de Buch states that the *Gryphææ* have a lateral lobe, but this lobe is no more constant than the other characters, and is of no more value than they are. There are species in which it is scarcely marked, others in which it is deeper, but in some individuals it is altogether wanting. This lobe, regarded as characteristic by M. de Buch, is also found, as he acknowledges, in the oysters, and so is common to the two genera which he would separate; it also shows itself in some *Exogyræ*: the small degree of constancy which it offers renders it unimportant and valueless. The *Exogyræ*, says M. de Buch, also have a tendency to take a dorsal angle. We shall first observe that the type of the genus *Exogyra costata*, Say, has never any keel; and next, that it is absent in many other species. If some *Exogyræ* have a dorsal keel, others have it not; the character then cannot be regarded as constant; this therefore is insufficient to found the new genus. Nothing then remains as a character but the form of the umbo. In *Exogyra* it is rolled on itself laterally; in *Gryphæa* it is elevated upwards. In this respect the examination of the *Exogyræ* becomes interesting. Many species of oysters have the umbo always turned to the side; others, which have it ordinarily straight, have accidentally this part equally turned laterally; the *Exogyræ* bear such resemblance to the oysters, that it is impossible to trace the limits of those two groups. But this is not all; if the *Gryphææ* pass to the oysters by the progressive lowering of the umbo, they pass also to the *Exogyræ* by a certain number of species with the umbo more and more oblique, so that the distinction between the *Gryphææ* and *Exogyræ* is not more clear than that between the oysters and *Gryphææ* on the one side, and between the oysters and *Exogyræ* on the other. Thus the *Gryphææ* and the *Exogyræ* are not two diverging branches of the oysters, but these genera form a circle in which we pass from the oysters to the *Gryphææ*, from the *Gryphææ* to the *Exogyræ*, and from the *Exogyræ* to the oysters and all by insensible gradations. The intimate relations which connect these three genera, the concatenation of their characters, the manner in which, so to speak, they penetrate each other mutually, afford, in my opinion, the most convincing proof that these three genera, artificial when separated, form, when reunited, one very natural genus; nor can we agree with M. de Buch, that they are separate in a manner '*nette, précise, et tranchée.*'

'M. de Buch considers the lobe of certain *Gryphææ* and the enlargement observable in some oysters (*Ostrea carinata*) as analogous parts to the auricles of the Pectens. I am far from partaking of the opinion of the learned geologist. I perceive too great a difference between the animals of the Pectens and of the oysters in the more important parts of their organization to admit in one the parts of the other in a certain state of modification. The part of the mantle which in the Pectens produces the auricles, is not that which forms the lobe in the *Gryphææ*. All the Pectens, without exception, are regular and have auricles; all the oysters, without exception, are irregular and want auricles like those of the Pectens. In the oyster cited by M. de Buch (*Ostrea carinata*, and other analogous species) the enlargement of the upper part is due to the position of the muscle upon this enlargement, and to the adherence of the shell on this enlarged part. It cannot therefore be compared to the auricles of the Pectens, for they have no reference to the adductor muscle. When we know the differences between the animals of the Pectens and oysters, we cannot admit the conclusion of M. de Buch, namely, that the oysters are Pectens without auricles or having them horizontal, whilst the *Gryphææ* have only one represented by the lateral lobe, the other being abortive as a consequence of the form of the shells.'

Without pursuing the argument of M. Deshayes further, we must conclude this discussion, which is of high interest to those who seek for the principles on which generic distinctions should be founded, as we began it. *Gryphæa* and *Exogyra* may be introduced to facilitate references, and are convenient but arbitrary subsections: that they have any claims to separation from the oysters, as distinct types, we cannot admit.

The True Oysters have been divided into two groups which may be satisfactorily used by zoologists and geologists as subdivisions of this numerous genus.

A. True Oysters with simple or undulated, but not plaited valves.

This considerable group, which consists of between thirty and forty recorded species (recent), may be illustrated by well known *Ostrea edulis*, or *Common edible oyster* of the European seas.

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[*] Mangrove oyster, prized in the West Indies for its delicious flavour: often found in company with *Perna Ephippium*, which is considered even a greater delicacy than the former.

These delicious oysters are the *Ostrea* of the ancient Italians; *Ostriche* of the modern Italians; *Ostras* of the Spaniards; *Austern* of the Germans; and *Huîtres* of the French.

The ancient Roman epicure well knew the value of the British oysters (Juvenal, iv. 140), nor have they lost their celebrity in modern times.

But excellent as the oysters of Britain undoubtedly are, there are many degrees of that excellence, the animal varying much both in size and flavour, according to the nature of the coast and the food with which the locality is furnished. The oysters on the south coast are generally very well flavoured; but it has been said that the best are found at Purfleet and the worst at Liverpool. The Tenby oyster is large and rather coarse; but when fat is well-flavoured, and excellent when well stewed or pickled. Colchester and other places in Essex are the great nurseries or feeding-grounds for supplying the metropolis, and indeed, in a great measure, England generally, with this highly-flavoured species. Here the oysters collected at various places on the coast, even as far as Scotland, are brought and laid on beds in creeks along the shore, where their flavour and size are rapidly improved. They have been known to augment the circumference of their shells even to the extent of an inch during the first two months, but in such cases the concavity within the valves is shallow. Bishop Sprat, in his 'History of the Royal Society,' gives a detailed account of the treatment of oysters in the beds or layers.

The favourite food of the oyster, according to M. Gaillon, consists of a green *Navicula* (*Vibrio ostrearius* of authors) and various species of that and other genera of *Infusoria*: these make the oyster fat, tender, and peculiarly well flavoured; others again are said to be injurious to it.

The number of vessels employed in dredging for oysters is supposed to be about 200, giving employment to some 400 or 500 men and boys; and the quantity of oysters bred and taken in Essex, mostly for London consumption, has been stated at 14,000 or 15,000 bushels annually.

Property necessarily exposed, as these valuable oyster-beds must be, required the protection of the legislature. (Stat. 31 George III., c. 51; 48 George III., c. 144; and 7 & 8 George IV., c. 29.) By the last-named statute, (which repeals 31 George III., c. 51,) sec. 36, stealing of oysters or oyster-brood from any oyster-bed, laying, or fishery, is larceny, and the offender upon conviction shall be punished accordingly. Moreover, if any person shall unlawfully and wilfully use any dredge, net, &c., for the purpose of taking oysters or oyster-brood, within the limits of any oyster-bed or fishery, every such person shall be deemed guilty of a misdemeanor, and, upon being convicted thereof, shall be punished by fine or imprisonment, or both, such fine not to exceed 20*l.*, and such imprisonment not to exceed three calendar months. The statute contains a proviso that the catching floating fish with any net, instrument, or engine adapted for catching such fish, within the limits of any oyster-fishery, shall not bring the fisher within the penalties of the Act.

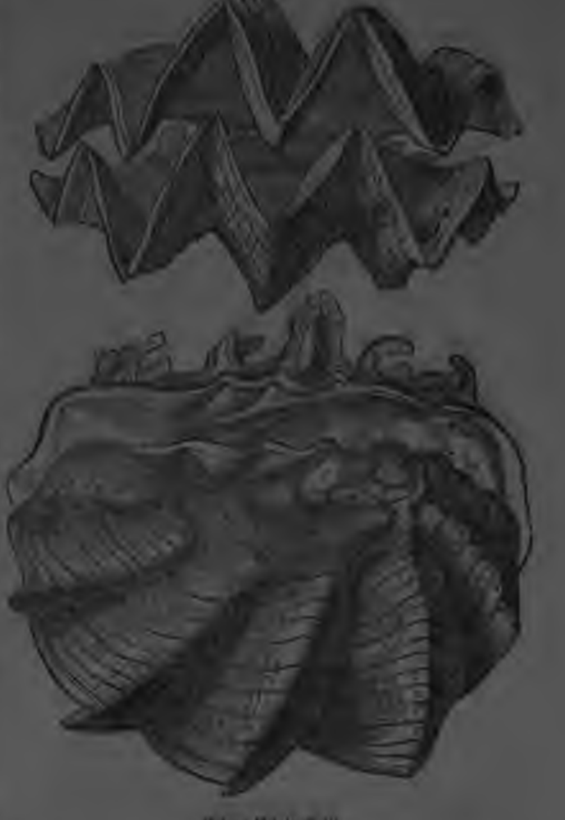
The bill for the protection of the oyster-fisheries in Scotland, now (April, 1840) before parliament, provides that any person in Scotland knowingly stealing oysters from a bed, laying, or fishery, which is sufficiently marked as the property of other persons, shall be deemed guilty of theft, and punished accordingly; and that any person using any net, dredge, or other instrument, within the limits of such oyster-fishery, for the purpose of taking oysters, although none be actually taken, shall be deemed guilty of an attempt to commit theft, and be liable to fine or imprisonment, the fine not to exceed 20*l.*, and the imprisonment not three months, with a clause that nothing in the act shall prevent persons from catching floating fish in an oyster-fishery with instruments adapted for taking floating fish only.

B. True Oysters, with the borders of their valves distinctly plaited.

Of this group, consisting of more than thirty recorded species (recent), *Ostrea Crista Galli*, the *Cockscomb Oyster*, will serve as an example.

Description.—Shell varying in form according to the bodies to which it adheres, but generally somewhat rounded, very much plaited, the plaits longitudinal and angulated; internal border rough; externally violet, purplish, or reddish-white. The shell externally has subgranulous striæ, and rarely elevated subtubular scales.

Locality.—East Indian Seas.



Ostrea Crista Galli.

The number of species of *Ostrea*, excluding *Gryphæa*, given by M. Deshayes in his Tables, is 54 living and 72 fossil (tertiary). The species there recorded as both living and fossil are *Ostrea Cornucopiæ*, *edulis*, *Virginica*, *Hippopus*, *navicularis*, *Forskalii*, and a 'new species.'

In the last edition of Lamarck the number of recent species, some of which may be varieties, is 55, and the number of fossil only 52.

The fossil species occur as low down as the lias (inclusive), and some of the species are considered characteristic of certain strata, *Ostrea dilatata*, for instance, of the Kimmeridge clay, or oak-tree clay of Smith, and *O. pulchra* of the plastic clay.

Placuna. (Brug.)

Animal very much compressed.

Shell free, irregular, very much flattened; valves delicate and almost translucid, quite translucid in some species, nearly equal, and subequilateral; hinge internal, offering on one valve two longitudinal, trenchant, rib-like elevations, converging at the summit, and, on the other, two furrows, corresponding to these ribs, and giving attachment to the ligament; muscular impression subcentral and rather small. (Rang.)

Geographical Distribution, &c.—The zone of warm climates: the species now known are from the East Indian and Red Seas, and have been taken on sandy bottoms.

M. Deshayes remarks that the animal is not known, but that he is convinced that it has a great analogy to that of *Anomia*.

The number of species recorded in the list of M. Deshayes is three living and one fossil (tertiary). Of the living species, *Placuna papyracea* is noted as both living and fossil (tertiary).* Four species are enumerated in the last edition of Lamarck as they were in the first; but the fourth, *Placuna pectinoides* (fossil), is considered to have all the characters of *Plicatula*, and is therefore removed by M. Deshayes to that genus. Mr. G. B. Sowerby had previously given a similar opinion. (*Genera.*) The species best known are, *Placuna Placenta*, vulgarly known as the *Chinese Window Oyster*, the valves of which are sufficiently delicate to transmit light; and *Placuna Sella*, known to collectors as the *Saddle-Oyster* (from Tranquebar, &c.).

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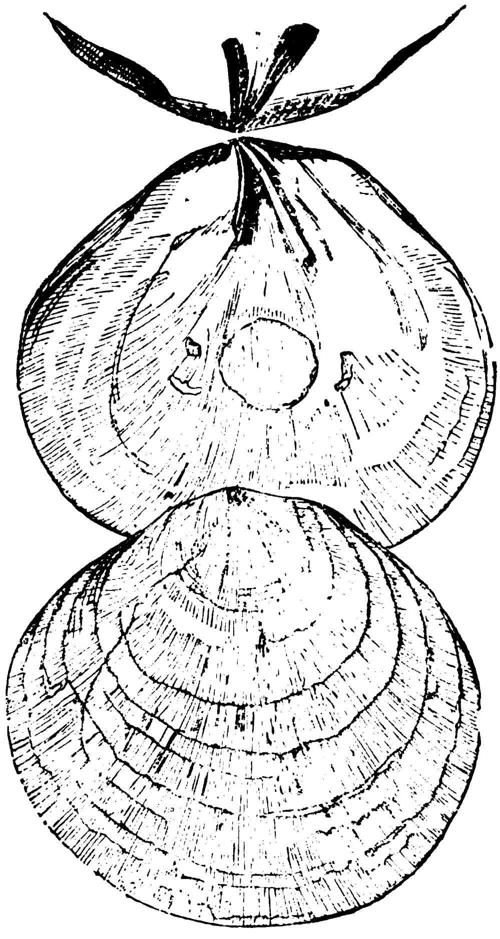
* The papyracea of Lamarck in [illegible]

Example, *Placuna Placenta.*

Description.—Shell suborbicular, flat, pellucid, white, with longitudinal, subdecussate striæ.

Locality.—East Indian Seas.



Placuna Placenta.

Placunanomia. (Brod.*)

Generic Character.—Animal probably intermediate between that of *Placuna* and *Anomia.*

Shell adherent, subequivalve, irregular, flattened, plaited towards the margin, vitreous internally. *Hinge* internal, with two elongated, thick, subcurved, divaricated teeth converging at the base in the lower valve, and two ligamentiferous furrows opposite in the upper valve. *Lower valve* superficially fissured externally towards the hinge, the subosseous organ of adhesion inserted between the laminæ of the shell and filling the fissure externally. Muscular impression in each valve subcentral. In the upper valve the impression of the organ of adhesion is superadded.

This interesting genus partakes of the characters of the genera *Ostrea*, *Plicatula*, *Placuna*, and *Anomia.* It may be regarded as the connecting link between the two latter. With an arrangement of the hinge approaching very nearly to that of *Placuna*, it has the distinguishing organization of *Anomia*, while the external appearance of the shell, especially if viewed *in situ*, bears the strongest resemblance to *Plicatula* or some of the plicated *Oysters.* The organ of adhesion, which in its bony character (for it is more bony than shelly) resembles that of *Anomia*, does not perforate the lower valve directly, but is inserted between the laminæ of the internal surface of the lower valve above the muscular impression and below the hinge, and passes out into an external, irregular, somewhat longitudinal superficial fissure or *cicatrix*, which is narrowest at the hinge margin, and which it entirely fills to a level with the surrounding surface of the shell. (Broderip, *Zool. Proc.*, February, 1832.)

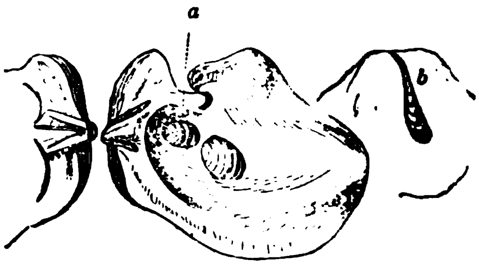
Geographical Distribution, &c.—The species are widely diffused, and inhabit the seas of warm climates in both hemispheres. Mr. Broderip has described four (*Zool. Proc.* and Müller's *Synopsis*) brought to this country by Mr. Cuming from the West Indies, Central America, and other western localities. They were dredged from sandy mud and muddy bottoms, adhering to bivalve shells, dead and living, and dead coral, at depths of six, eleven, and seventeen fathoms; of these, *Placuna echinata* wears something of the appearance of the short-spined *Spondyli.* Besides the species above alluded to, Mr. Broderip states that Mr. Sowerby furnished him with an odd valve of a large species from Luçonia, which was beautifully iridescent internally; but as it was believed that this was identical with the fine shell sold by him to the British Museum, Mr. Broderip left the description of it to the officers of that establishment. Mr. Sowerby had some other odd valves, which Mr. Broderip thought might prove new, and the latter possessed two or three specimens adhering to *Spondyli*, from an unknown locality; but they appeared to be young, and though he was inclined to think that there was a new species among them, he deemed it prudent to wait for further information.

M. Deshayes remarks that this genus establishes the passage between *Placuna* and *Anomia*, and that it shows that the V-shaped tooth of *Placuna* is only an extreme modification of the large callosity of the *Anomiæ;* he adds that a fossil shell found in Egypt, and which has been taken for a *Placuna*, is a new step, as regards the hinge, between the *Anomiæ* and *Placunæ.*

Example, *Placuna Cumingii*, Brod.

Description.—Shell subround, obscurely silvered, white, flattened; margin plaited, the plaits very large; length two inches and a half, breadth seven-tenths of an inch, height two and three-quarters inches.

Locality.—Shores of Central America (Gulf of Dulce, Province of Costa Rico); dredged from a muddy bottom, at the depth of eleven fathoms, attached to dead bivalve shells and dead coral.



Placunanomia Cumingii.

a, Internal appearance of the organ of adhesion; *b*, the same seen extern[illegible]

Anomia. (Brug.)

Generic Character.—Animal very much compressed, having the borders of the mantle delicate, and furnished externally with a row of tentacular filaments; foot rudimentary; adductor muscle divided into three branches, the largest of which passes by a notch in the lower valve in order to attach itself to an opercular stony or corneous piece fixed to marine bodies.

Shell adherent by its opercular piece, inequivalve, inequilateral, irregular, delicate, and often translucid; the flat valve most flattened, having a round or oblong notch near the umbo for the reception of the opercular piece; the other larger and more concave; both joined by a short and thin ligament; muscular impression separated into three portions. (Rang.)

Geographical Distribution.—The recorded species are generally quoted as coming from the European seas and the Atlantic Ocean. The depths at which they have been taken are stated to vary from the surface to twelve fathoms, adhering to oysters, and other shells, rocks, &c.

The species are not very numerous; and perhaps more are recorded than actually exist; for the shell will take upon itself the regularities or irregularities of the body to which it is attached. Thus on a Pecten, an individual will become striated like that Pecten through both valves, while another of the same species is smooth if adherent to a comparatively smooth body. M. Rang observed this frequently on the shores of the Mediterranean, and both Mr. G. B. Sowerby and M. Deshayes make the same observation.

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* M. Deshayes (last edition of Lamarck) erroneously attributes the establishment of this genus to Mr. Sowerby. The error is perpetuated in the useful 'Conchological Manual' of Mr. G. B. Sowerby, Jun.

The number of species recorded by M. Deshayes in his tables is ten living and eight fossil (tertiary), and of species both living and fossil (tertiary), two, viz. *Anomiæ Ephippium* and *Electrica*.

In the last edition of Lamarck only nine species (recent) are mentioned, and but one fossil only (*A. tenuistriata*); indeed the specific names of some of the fossils noticed in the tables, *costata*, *dubia*, and *striata*, recal to the observer the remarks made by zoologists touching the varied nature of the surface of these shells according to accidental circumstances.

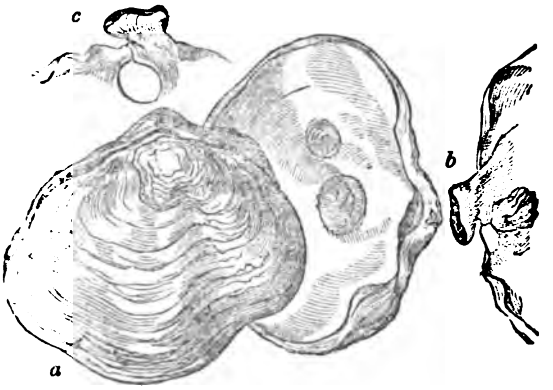
The fossils are found in the crag and London clay, and in the marine formations above the chalk in France.

Lamarck considered the animal of *Anomia* (*Echion* of Poli) as closely allied to that of the *Oyster* in its organization; but M. Deshayes observes that he does not agree in opinion with those zoologists. The *Anomiæ*, he thinks, furnish very interesting materials for study, and he believes that they approximate to the *Terebratulæ*, at least as much as the *Oysters*, and may probably be animals belonging to two groups, and serving as the passage from one to the other. If this be so, he adds, the genus would not be greatly changed in its methodical position; for if Cuvier and his imitators have separated these genera too widely, Lamarck and some others, following the inspiration of Linnæus, have approximated them as much as their still small knowledge of the animals would permit.

Example, *Anomia Ephippium*.

Description.—*Shell* suborbiculate, rugoso-plicate, waved, planulate, with an oval foramen, whitish or yellowish, often reddish yellow, below. One of the largest species.

Localities.—British Channel; Mediterranean; Atlantic Ocean.



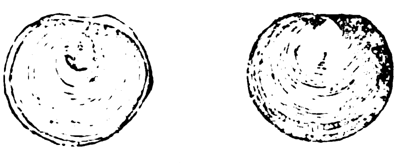
Anomia Ephippium.

a, valves closed; *b*, open to show the hinge; *c*, hinge of attached valve and the bony appendage.

Bony appendage of Anomia Ephippium adhering to rock.

a, the bony part that goes through the opening of the shell; *b*, the surface which is attached to external objects.

M. de Blainville records a species, *Anomia squamata*, which has not this bony appendage, and which he says is fixed by the valve itself. This so-called species however, which should be *Squamula*, is in Mr. G. Sowerby's opinion nothing more than *An. Ephippium* in a very young state before the appendage is ossified. In this opinion we concur. [SPONDYLIDÆ.]



Anomia squamata.

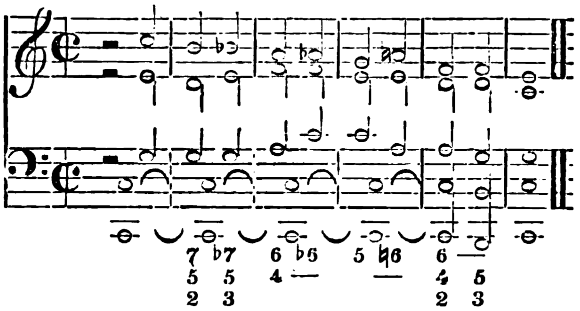
PECTU'NCULUS. [POLYODONTA.]
PECULIAR. [WILL.]

PEDAL. In musical instruments Pedals are of two kinds:—1, those keys which are acted on by the feet of the performer; 2, the levers acting on the swell of the organ, and on the stops; and also those of the piano-forte and harp, the uses of which are too well known to require explanation.

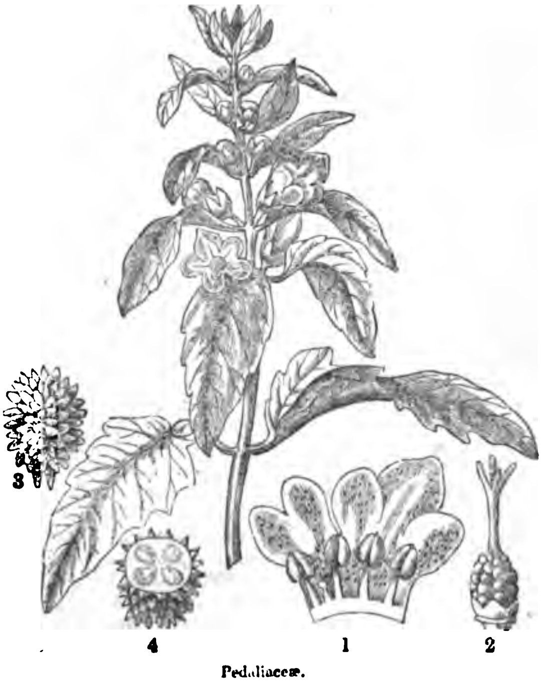
The Pedals, or foot-keys, of the organ were invented in the fifteenth century, by a German named Bernhard; but it was long before they had travelled beyond the confines of the country to which they owed their birth; and, strange to say, England was the last to adopt them, though the first to introduce the organ generally into the church. But by slow degrees their utility and importance were discovered and acknowledged, and now no organ, except of small dimensions, is built without these most desirable auxiliaries, and no organist is esteemed who is not tolerably well skilled in the use of them. [ORGAN.]

PEDAL-BASE (or *Pedale*), in music, is a base which remains stationary on one note, while the other parts continue moving and forming various chords, all of which, however, must be related to the holding note, according to the laws of harmony.

Example:—



PEDALIACEÆ, a small natural order of monopetalous Exogens, very nearly related to the Verbenaceous order, having like it irregular and usually didynamous flowers and a few seeded 2- or 4-celled fruit; but differing in having the radicle directed towards the base instead of the apex of the fruit. From Bignoniaceæ, with which they are more generally compared, their wingless seeds offer the principal distinction. They are all exotic tropical herbaceous plants, with opposite leaves and axillary flowers, and are of little known use, with the exception of the genus Sesamum, whose seeds afford a bland oil not inferior, when fresh, to that of the olive. [SESAMUM.]



Pedaliaceæ.

A shoot of Josephinia imperatricis in flower. 1, The corolla laid open; 2, the pistil; 3, the ripe fruit; 4, a transverse section of the latter.

PEDEE, River. [CAROLINA, SOUTH.]

PEDESTAL. [COLUMN.]

PEDE'TES. [MURIDÆ, vol. xv., p. 513.]

PEDICEL. [PEDUNCLE.]

PEDI'CULUS, according to Linnæus, a genus belonging to the Insecta Aptera. These insects, commonly called lice, form the order Anoplura of Dr. Leach, and Parasita of Latreille, so called from their parasitic habits, many mammals, if not all, and perhaps all species of birds, being infested by them; each species of bird and mammal, it would appear, having its own peculiar species of louse, and sometimes even two or three distinct species. Latreille thus characterises this order of insects:—Their body is flattened, nearly diaphanous, and divided into eleven or twelve distinct segments, of which three belong to the trunk (or thorax), each bearing one pair of legs. The first of these segments frequently forms a sort of thorax (or rather prothorax). The stigmata are very distinct. The antennæ are short, equal, composed of five joints, and frequently inserted in a notch. There are one or two small ocelli on each side of the head. The legs are short, and terminated by stout claws, or two opposing hooks, which enable these animals to cling with great facility to the hairs of quadrupeds or the feathers of birds, whose blood they suck, and on whose body they propagate and pass their lives. They attach their ova to these cutaneous appendages, and multiply excessively, one generation succeeding another with great rapidity. Particular and unknown causes facilitate their increase to an astonishing degree, the *P. humanus*, under such circumstances, producing in man what is termed the *morbus pediculosus*. Their movements are slow.

Three species of lice are said to infest the human subject: the *P. humanus*, which inhabits the bodies and garments, and is known by the name of the body-louse; the *P. cervicalis*, or *P. humanus capitis* of De Geer, which inhabits the head of man, and particularly children; and, lastly, the *P. pubis* of Linnæus, which constitutes Leach's genus *Phthirus*. This species inhabits the eyebrows, &c., and is commonly known by the name crab-lice.

The following are the principal genera into which the Pediculi are divided:—

In *Pediculus* proper the mouth, which is in the form of a snout, consists of a very small tubular mammilla situated at the anterior extremity of the head; the tarsi are composed each of a joint almost equal in size to the tibia, and terminated by a strong claw, which folds over a projection, and fulfils the function of a forceps; the thorax is composed of three distinct equal segments. The *P. humanus* and *P. cervicalis* belong to this genus.

The genus *Phthirus* differs from Pediculus in having the body wide and rounded, the thorax very short and confounded with the body: the anterior feet are simple, and the two hinder pairs are didactyle.

The *Pediculus* of the hog has the thorax narrow and distinct from the abdomen, which is very broad; it constitutes, according to Leach, the genus Hæmatopinus.

The *Nirmi* (*Nirmus* of Hermann, Leach, &c., and *Ricinus* of De Geer) have the mouth situated beneath the head, and composed of two lips and two hook-like mandibles; their tarsi are very distinct, and terminated each by two equal hooks. Latreille says that the species of this group, with one exception, that of the dog, are exclusively confined to birds.

PEDIGREE. A pedigree is a tabular view of the members of any particular family, with the relations in which they stand to each other; together, usually, with some slight notice of the principal events of the life of each, as the time and place of birth, marriage, death, and burial, the residence, the profession, or rank of the principal person named in it, and public offices held by him. Sometimes these are accompanied by reference to evidence of the fact stated, as to inquisitions, parish-registers, monumental inscriptions, marriage-settlements, and deeds of all kinds. But when there is much of this kind of information and evidence introduced, the writing is rather called a genealogy, or a genealogical history, than a pedigree; and many pedigrees, especially those of early date, are wholly deficient of reference to evidence for proof of the things stated in them, and contain rarely dates or anything more than the mere names of the parties who occur in them. They appear to be the summaries, or things established by certain evidences which may or may not now accompany them, in respect of descents and relationships.

Some fanciful explanations have been given of the word. But perhaps the true etymology may be that which refers it to the Latin *pedes graduum*, the word *pes*, or *pedes*, being much used in the law Latin of the middle ages to denote *summaries*, or the ultimate result in any transaction, as in *pedes finium* and *pedes compoti*. So that a pedigree is, as it were, a *total* of information or evidence respecting descents and kindredships.

The Scripture genealogies, as they are called, are so many pedigrees, but with this difference from the proper idea of a pedigree, that they are not tabular, but narrative.

Tabular genealogies, or pedigrees properly so called, are not of very frequent occurrence in the writings of the middle ages. But they are sometimes found in public records, and in the evidences of private families, or entered in the chartularies of the monastic foundations. They are generally short, containing for the most part only such matter as was wanted for the exhibition of some particular claim of right. But at about the beginning of the sixteenth century, when the College of Heralds began to pay much attention to the genealogy of the English families in reference to their claims to dignities and to the distinction which the right to armorial insignia gives, many pedigrees were compiled, and in the course of that century the heralds obtained copies of all such accounts of the English families of any distinction as could be supplied to them, and made such accounts matter of public record by entering them in the books which contain the record of their official proceedings. To obtain information of this kind, it was the practice of the heralds of that century, and it continued to be their practice till about the year 1680, to visit the various counties of England from time to time in turn, and to collect from the mouths of the principal persons of each county what they knew of the changes which had taken place in the [illegible] since the time of the preceding visitation, or what account could be given of themselves by families who had recently stepped into the rank of gentry, or who had become recently settled in the county. The pedigrees thus collected are in the visitation books at the College of Arms, and form a vast body of this species of information highly important to those who are studying critically the biography of the distinguished persons of the English nation.

Besides this grand collection of pedigrees, there are many similar collections made by private persons, or by the heralds themselves in their private capacity. Many such collections are in the library of the Heralds' College; others are in the British Museum; others in the hands of private persons. Copies of the visitation books are also often to be found. The largest collection of copies is in the British Museum, though copies of some of the best visitation books are not in any of the collections in that depository. There are many copies in the libraries of Queen's College, Oxford, and Caius College, Cambridge.

Since the visitations were discontinued, there has been no official and regular collection of pedigrees. But there has been a continual addition made to the pedigrees which are on record in the visitation books by the entry in the books of the Heralds' College of their pedigree by particular families. In some cases, as of peers, this is compulsory. When arms are granted or dignities conferred, it has been usual for families to record in the college what they know of their descent and alliances. But the books are open to any [illegible] family, who may, at a moderate expense, enter a pedigree showing the existing state of the family, and whatever is within the recollection of the older members of it, or can be proved by sufficient evidence. The entries thus [illegible] made are matter of record, and contain information which is often very interesting to the posterity of the persons who occur in them, and may be of importance in protecting rights which belong to them.

The authors of the books of topography have done something to supply the loss of information of this kind which has been sustained by the disuse of the visitations, such works usually containing notices of the families who have possessed the more important interests in the district to which the work relates.

PEDIMENT. [CIVIL ARCHITECTURE.]

PE'DIPES, Adanson's name for a genus of [illegible] shells belonging to the family *Auriculacea* of M. de Blainville and *Colimacea* of Lamarck.

Generic Character.—Animal furnished with [illegible] tentacles, implanted vertically on the head and divergent; eyes oval and situated within and at the base of the tentacles, but elliptical, divided into two portions by a wide transversal furrow; mouth furnished with an upper piece corresponding to a lingual mass armed with small hooks.

Shell globular or oval, thick; summit projecting but little; last whorl of the spire larger than all the others united; aperture long, oval, or linear, with disunited borders; columella solid, furnished with two projecting laminæ; a third very much elevated on the convexity of the penultimate whorl; external lip trenchant and furnished sometimes with small ribs within.

Hitherto two recent species only are known; they are small.

Example, *Pedipes Adansonii*. See Adanson, *Senegal*, t. 1, f. 2.

PEDLAR. This word is said by Dr. Johnson to be a contraction from *petty dealer*, formed into a new term by long and familiar use; and a pedlar is defined by him to be 'one who travels the country with small commodities.' The same writer defines a *hawker* to be 'one who sells his wares by proclaiming them in the street.' In legal understanding however a hawker is an itinerant trader, who goes about from place to place, carrying with him and selling goods; and a pedlar is only a hawker in small wares. In the various acts of parliament which impose duties upon them and regulate their dealings, they are always named in conjunction as hawkers and pedlars; and no distinction is made between them.

It has been for more than a century the policy of English law to consider the conduct of trade by means of fixed establishments as more beneficial to the public than that of itinerant dealers; and it cannot be denied that the local trader being better known and more dependent upon his character than one who continually travels from place to place, there is a greater security for the respectability of his dealings. In conformity with this policy, statutes have been passed from time to time, obliging hawkers and pedlars to take out licences and to submit to specific regulations and restrictions, which are supposed to protect the resident trader as well as the public from unfair dealing. These reasons however have been given *ex post facto* to justify the laws; for the statutes which originally required licences for hawkers and imposed these duties appear to have merely contemplated a means of increasing the revenue. (8 and 9 Will. III., c. 25; and 9 and 10 Will. III., c. 27.)

The provisions by which the licences to hawkers and pedlars are now regulated are contained in the statute 50 George III., c. 41. By that Act, the collection and management of the duties on hawkers and pedlars in England was given to the commissioners for licensing and regulating hackney coaches; but this duty has since been transferred to the commissioners of stamps by the 75th section of the statute 1 and 2 Will. IV., c. 22. By the provisions of the latter statute, 'all the powers, provisions, regulations, and directions contained in the statute 50 George III., c. 41, or any other act relating to the duties on hawkers and pedlars, are to be enforced by the commissioners of stamps; and all the powers, provisions, regulations, and directions, forfeitures, pains and penalties imposed by any acts relating to the management of duties on stamps, so far as the same are applicable to the duties on hawkers and pedlars, are declared to be in full force and effect, and are to be applied and put in execution for securing and collecting the last-mentioned duties, and for preventing, detecting, and punishing all frauds, forgeries, and other offences relating thereto, as fully as if they were repeated and specially enacted in the statute 1 and 2 Will. IV., c. 22.' The duty of granting licences to hawkers and pedlars and enforcing the law against such persons is now therefore entrusted to the commissioners of stamps; the particular conditions and regulations under which such licences are to be granted being contained in the above-mentioned statute 50 George III., c. 41.

Before a licence is granted to a person desirous of trading and travelling as a hawker or pedlar, the applicant must produce to the commissioners of stamps a certificate, signed by the officiating clergyman and two householders within the parish in which he resides, attesting that he is of good character and a fit person to be licensed. Upon this certificate being given, the commissioners grant the licence, which is only in force for one year, and the party who receives it is subject to a duty of 4*l.* per annum, if he travels on foot or with [illegible] alone, and an additional duty of 4*l.* per annum if he travels with a 'horse, ass, mule, or other beast bearing or drawing burthen;' and these duties are to be paid at the time of receiving the licence. All persons who act as hawkers or pedlars without such a licence are liable to a penalty of 40*l.* Among other regulations, the hawker or pedlar is required by the Act to 'cause to be written in large legible Roman capitals, upon the most conspicuous part of every pack, box, bag, trunk, case, cart, or waggon, or other vehicle in which he carries his goods, and of every room and shop in which he trades, and likewise upon every handbill or advertisement given out by him, the words "Licensed Hawker," together with the number, name, or other mark of his licence;' and in case of his omission so to do, he is liable to a penalty of 10*l.*; and every unlicensed person who places these words upon his goods is liable to a penalty to the like amount. A hawker and pedlar travelling without a licence, or travelling and trading contrary to or otherwise than is allowed by the terms of his licence, or refusing to produce his licence when required to do so by inspectors appointed by the commissioners, or by any magistrate or peace-officer, or by any person to whom he shall offer goods for sale, is liable in each case to a penalty of 10*l.* A person having a licence, and hiring or lending it to another person for the purpose of trading with it, and also the person who so trades with another's licence, are each liable to a penalty of 40*l.* A hawker or pedlar dealing in or selling any smuggled goods, or knowingly dealing in or selling any goods fraudulently or dishonestly procured, forfeits his licence, and is for ever afterwards incapacitated from obtaining or holding a new licence. By the stat. 48 Geo. III., c. 64, s. 7, if any hawker or pedlar shall offer for sale tea, brandy, rum, Geneva, or other foreign spirits, tobacco, or snuff, he may be arrested by any person to whom the same may be offered, and taken before a magistrate, who may hold him to bail to answer for the offence under the excise laws.

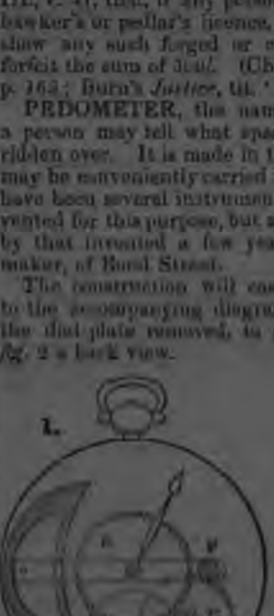
By the provisions of the statutes 29 Geo. III., c. 26, s. 6, and also of 50 Geo. III., c. 41, s. 7, no person coming within the description of a hawker or pedlar can lawfully, either by opening a shop and exposing goods to sale by retail in any place in which he is not a householder or resident, or by any other means, sell goods either by himself or any other person by outcry or auction, under a penalty of 50*l.*

It is further provided by the 15th section of the 50 Geo. III., c. 41, that, if any person shall forge or counterfeit any hawker's or pedlar's licence, or travel with, or produce, or shew any such forged or counterfeited licence, he shall forfeit the sum of 300*l.* (Chitty's *Commercial Law*, vol. ii., p. 162; Burn's *Justice*, tit. 'Hawkers.')

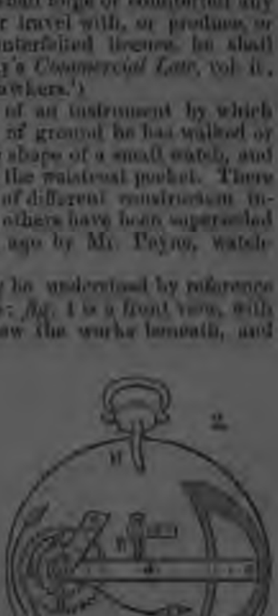
PEDOMETER, the name of an instrument by which a person may tell what space of ground he has walked or ridden over. It is made in the shape of a small watch, and may be conveniently carried in the waistcoat pocket. There have been several instruments of different construction invented for this purpose, but all others have been superseded by that invented a few years ago by Mr. Payne, watchmaker, of Bond Street.

The construction will easily be understood by reference to the accompanying diagrams: *fig.* 1 is a front view, with the dial-plate removed, to shew the works beneath, and *fig.* 2 a back view.

1.



2.



Motion is communicated from the traveller to the machinery of the pedometer by means of a horizontal lever L, *fig.* 2, which is furnished with a weight at one end and a pivot or axle at the other; under the lever is a spring S, which keeps the lever when at rest close up to the regulating screw R; this spring is so arranged as to be only just sufficiently strong to overcome the weight of the lever and to prevent its falling downwards.

When the body of the traveller is raised, either by the spring of his foot or the motion of his horse, the lever is impelled downwards by the jerk, and immediately returned to its place by the spring, and so long as the motion is continued the lever is constantly in a state of vibration. Fixed on the axis, X, of the lever, and moving with it, is a small ratchet-wheel, A; beneath this is another and larger ratchet-wheel, B, which fits on the same axis, but is not attached to it. These two wheels are connected together by a ratchet or pall, in such a manner that when the lever falls, both wheels are moved forward one or more teeth, but when the lever rises again by the force of the spring, S, the larger rachet-wheel, B, is held stationary by the ratchet or pall, P. This wheel, B, is connected with a series of toothed wheels and pinions, C D E (*fig.* 1.), by means of a pinion, F, fixed on its under surface. The centre wheel, E, carries a hand or index, which points to the figures upon the dial-plate to denote the number of miles passed over.

These instruments are generally made to register ten miles, but that of course depends on the number and relative size of the wheels between the lever or motive power and the index; by placing an extra pinion and wheel in the same manner as for the seconds hand of a watch, and making the wheel with ten times the number of teeth contained in the pinion, you get a second register, which will mark one division for every ten passed over by the larger index hand; the pedometer will then register a hundred miles. The accuracy of the instrument depends upon the proportion which the vibrations of the lever bear to the divisions on the dial-plate, and this can be altered by the small regulating screw, R (*fig.* 2), placed above the lever.

It is necessary that the pedometer should be carried in such a position that the lever shall be always as near as possible horizontal: for this purpose a small hook, H, is placed on the pendant or handle, by which the instrument may be suspended in the pocket.

With a slight difference of construction, this pedometer may be adapted to carriage travelling. For that purpose the lever must hang perpendicularly, and it does not require any regulating screw, but may vibrate backwards and forwards like a common pendulum: this is rendered requisite on account of the motion of the carriage being in the opposite direction to that of the body of a horseman or pedestrian, the former being backwards and forwards, while the latter is upwards and downwards.

The works of the pedometer may be attached to a watch, the index being placed in the dial-plate, in the same manner as that of a second's hand.

PEDUM. [PECTINIDÆ]

PEDUNCLE is that part of a plant which is called the stalk of the flower; it is not however, like the petiole with respect to the leaf, a component part of the flower, but is in reality a branch, usually of an ephemeral nature, and consisting of a single internode or of several; in the latter case it bears bracts, which indicate the station of the nodes, and which occasionally produce other branches from their axils; when this happens, such secondary branches are named *pedicels*. The naked *scape* of botanists, such as is found in the hyacinth, is in reality nothing but a peduncle which rises immediately from the bulb, and whose first internode is exceedingly long.

PEEBLESSHIRE, or TWEEDDALE, a county of Scotland, bounded on the north by Edinburghshire, on the south by the shires of Selkirk and Dumfries, on the east by those of Selkirk and Edinburgh, and on the west by Lanarkshire. It is situated between 55° 24′ and 55° 50′ N. lat., and between 2° 45′ and 3° 33′ W. long. Its greatest length from north to south is 30 miles, and greatest width from east to west rather less than 22 miles. The area has been variously computed at 251,320 acres (Armstrong, *Companion to Scotch Atlas*), 229,778 acres (Findlater, *View of the Agriculture of Peebles*), and 241,185 acres (*New Statistical Account of Scotland*), the differences between which may in some measure be accounted for from the circumstance that the boundary of the county in some parts is very irregular and ill-defined, particularly the south-eastern portion, where it is doubtful whether a considerable tract of country belongs to this county or to Selkirkshire.

The general elevation of Peeblesshire exceeds that of any other county in the south of Scotland. The least elevated part in the county is near where the Tweed crosses the eastern boundary, which is between 400 and 500 feet above the sea-level. The most mountainous parts extend from the south-east to the south-western extremities of the county, including the sources of the Clyde, the Tweed, and the Annan, the courses of which rivers indicate a general decline in the surface of the lowlands from this part of the country. The only habitations to be seen throughout the dismal mountain-range are the shepherds' cottages, few number and widely scattered. On the north-east a [illegible] ridge of mountains separates this county from Edinburghshire; and on the north-west it is separated from the same county by the Pentland Hills, among which the North Esk, the Leith Water, the Medwin (a tributary of the Clyde), and the Lyne (a tributary of the Tweed, which gives name to the town and parish of Linton), have their rise. The principal elevations are Culterfell and Cardon, in the parishes of Kilbucho and Glenholm, the summits of each of which are more than 2400 feet above the sea-level; Dollarlaw (2[illegible] feet, according to Armstrong), in the parish of Manor, whence there is an extensive view of the Lothians, Berwickshire, and the English borders; Hell's Cleugh (2[illegible] feet, according to the same authority), in the parish of Kirkeird; and Hartfell (2635 feet) and Broadlaw (2741 feet) in the parish of Tweedsmuir. The hills and mountains of the last-mentioned parish afford good pasturage for sheep and black cattle; and they are of such easy access, that the peat upon their summits, whence the cottagers are supplied, is brought down in common carts.

The Tweed, the only river of the county, takes its rise from a spring in the upper part of the parish of Tweedsmuir, situated 1500 feet above the sea-level, and upon the same hill from whose base issue the rivers Clyde and Annan. Its course within the county is north east by north until it reaches the town of Peebles, after which its course is nearly due east, crossing the northern parts of the counties of Selkirk and Roxburgh; and after separating Berwickshire from Northumberland, it falls into the German Ocean about half a mile below the town of Berwick, and about 1[illegible] from its source. In the first 20 miles of its course it descends through a height of 1[illegible]00 feet. It is remarked in the 'New Statistical Account of Scotland,' that so long as this river flows in a north-east direction, the hills on both sides equally healthy for sheep-pasture, and the disease called 'illness' is almost unknown; but so soon as it takes easterly direction, the sheep on the right bank become subject to that disease, and also to what is called 'louping-ill,' to an extent tenfold greater than what takes place among those on the hills of the left bank, which have a southern aspect. The numerous rivulets which intersect the county all tributaries of the Tweed. The chief of these are the Lyne, already mentioned; the Peebles or Eddlestone, which falls into the Tweed at the town of Peebles; the Leithen; the Manner; and the Quair, which last falls into the Tweed near the seat of the Earl of Traquair. From the hilly character of the country through which they flow, these rivers are subject to sudden inundations, which sometimes occasion considerable injury to the adjoining lands. Most of these streams, and particularly the Manner, contain, during season, both salmon and trout. Eddlestone Loch is a small lake in the north-east part of the county, from which South Esk takes its rise. It abounds with pike, perch, and eels, and is the resort of large flocks of wild fowl during summer.

With the exception of the parishes situated on the right bank of the Tweed, the county is well intersected by roads which, though inconveniently narrow, are for the most part kept in good repair. The principal are those connecting Edinburgh and Moffat, and Lanark and Kelso. The former enters the southern part of the county near the source the Tweed, and winds through the valley of that river a single line for about 15 miles, when it separates into branches, one passing through Broughton, the other through Eddlestone, which again meet upon the borders of Edinburghshire. The road from Lanark to Kelso, which is the means of communication with Glasgow, crosses the northern part of the county from north-west to south-east, passing through the town of Peebles. The tolls of the county 1834 were let for 3351*l*., including the sum of 360*l*. paid by the post-office for the mail-coaches.

The climate is keen, but less severe than that of Edinburgh. The mean annual temperature of Tweedsmuir, the most elevated parish in the county, was 45° in 18[illegible]; the mean height of the barometer at the town of Peebles, which is 535 feet above the sea-level, is 29·2 inches in summer and 29 inches in winter; and the indications of a rain-gauge kept at the same place, upon an average of seven years, [illegible] an annual fall of 29·72 inches. The fogs so often met with in the Lothians seldom extend into this county.

The prevailing rock is whinstone, of which there are some excellent quarries in the vicinity of the town of Peebles, and from which the town has been chiefly built; but that which is found in other parts is, from its laminated structure, unsuitable for building. This whinstone, as it is commonly called, is a coarse argillaceous schist, the greywacke of mineralogists. In this county, in its simplest state, it is a fine clay-slate, of a dark lead colour, some of it so laminated as to afford roofing-slate. In the parish of Stobo it has been worked for that purpose for a long period. Another sort is a fine greywacke slate consisting of an argillaceous base intermixed with sand and mica. In a still coarser state it contains quartz gravel. White and red freestone are common in the north, and both coal and limestone have long been wrought at Carlops, in the parish of Linton. The village of Innerleithen is now much frequented on account of the water of a spring which has long been celebrated for the cure of old wounds, diseases of the eyes, and other complaints. Within a few years, Lord Traquair, the proprietor of the village, has erected a neat and commodious building whence the waters are now supplied to the visitors.

Of the 241,180 acres which, according to the 'New Statistical Account,' constitute the area of the county, the portion under cultivation, or occasionally cultivated, does not exceed 34,762 acres, or not quite one-seventh. Of that which is never cultivated, not more than 8349 acres are supposed susceptible of cultivation, and there are 6755 acres of underwood. In the united parishes of Broughton, Glenholm, and Kilbucho, where one-fourth of the entire surface is under the plough, the value of the arable land averages 25s. per acre (*Scotch acre, we suppose*). In breaking up the lea or pasture-ground which has lain for some seasons, the rotation of crops is:—'1st, oats or peas; 2nd, turnips or potatoes; 3rd, barley, among which rye-grass and clover-seeds are sown; 4th, hay.' The land then remains in pasture for a few years, or a fresh rotation commences. 'Leases are generally granted for nineteen years, but farms purely of the store kind are let for *fourteen years only*. The chief hindrances to improvement are, the non-residence of the proprietors; the distance from markets, coal, and lime; and to these may be added strict entails, which fetter both the landlord and the tenant.' (*New Statist. Acc.*, p. 92.) Enclosures and planting are on the increase, and improvements in agriculture meet with ready adoption. The buildings upon most of the farms of any importance have been entirely renovated within the last thirty years. The black-faced sheep were exclusively reared till the commencement of the present century. Since then the Cheviot breed has been introduced, and has increased so rapidly, that even in the most exposed situations their number now exceeds that of the other kind. The practice of smearing the sheep with grease is still general; but instead of tar, which was formerly employed, train or cocoa-nut oil is usually substituted. It prevents the wet penetrating to the skin of the animal, and is supposed also to increase the quality of the wool. The arable farms vary in extent from 40 to 200 acres; the sheep farms from 500 to 4000 acres. (Findlater, p. [illegible]) The total number of sheep in the county in 1834 was estimated at 102,000.

The county is divided into sixteen parishes, the aggregate population of which, in 1831, was 10,578 persons. These were distributed among 2512 families, of whom 790 were employed in agriculture, 560 in trade, manufactures, and handicraft, and 670 were not included in these two classes. The inhabitants generally are now said to be distinguished for neatness and cleanliness, both in their houses and persons, though formerly it was far otherwise.

From the summary of the returns relative to the state of education in Scotland in 1834, printed by order of the House of Commons in 1837, it appears that, allowing for defective returns, the number of children in the county under five years of age who had been already taught or were then learning to read, was 86; of those between five and fifteen years already taught or then learning to read, the number was 1848, or rather less than two-thirds of the total number of children between those ages; and of those between five and fifteen already taught or then learning to write, the number was 1100. There were in all sixteen parochial schools, conducted by 17 instructors. The greatest number attending these schools during the half year ending Lady-day, 1834, was 467 boys and 391 girls; and the least number during the same period was 304 boys and 252 girls. The aggregate receipts of the parish schoolmasters in the year ending with Lady-day, 1834, amounted to 853l. 8s. 6d., and consisted of—salaries, 494l. 9s. 10d.; school-fees, 290l. 17s. 3d.; other emoluments 68l. 7s. 7d. There were also 14 non-parochial schools, conducted by 17 instructors, and attended by from 667 to 686 children.

The only antiquities of the county are the ruins of castles or towers, erected upon the banks of the Tweed and its tributaries to frustrate the inroads of the English. The walls were of whinstone, strongly cemented, and varied from eight to eleven feet in thickness. One of these, the castle of Neidpath, now the property of the Duke of Queensberry, during the conflict between Charles II. and Cromwell made a very stout resistance against the forces of the latter. Another, in the parish of Broughton, is called, for reasons unknown, the Castle of Macbeth.

Peebles, the county town, is agreeably situated in a valley on the northern or left bank of the Tweed, at the confluence of the Eddlestone Water with that river. It is 20 miles due south from Edinburgh and 42 east by south from Glasgow. From the pleasantness of its situation and its vicinity to Edinburgh, it became at an early period the summer residence and place of rural amusement of the Scottish kings, and particularly of Alexander III., in the early part of the thirteenth century. This king is supposed to have been the founder of the *cross kirk*, now a small ruin, dedicated to St. Nicholas, a Scottish bishop, who suffered martyrdom during the persecution of Maximian (A.D. 300), and whose bones were believed to have been found upon the spot afterwards occupied by the church. To this church was attached a monastery of red friars, which was suppressed at the Reformation. After the battle of Nevill-cross (1346), in which David II. was taken prisoner by the English, the town of Peebles contributed largely towards his ransom, in consideration of which he, in 1367, created it a royal burgh. In virtue of this title it afterwards returned a member to parliament, in union with the burghs of Lanark, Linlithgow, and Selkirk, down to the passing of the Reform Act, by which Act its elective franchise is merged into that of the county. The county has returned one member since the union of the two kingdoms. The town was exclusively situated to the westward of the Eddlestone till 1545, when, having been burnt by the English, a new town was commenced on the opposite bank, and surrounded by a wall, with gates, which latter were standing in 1707. The revenue of the burgh, consisting chiefly of rents, amounts to about 643l. annually. The annual expenditure is something less. There is however a debt, which in 1833 amounted to 2426l. A provost, two bailiffs, dean of guild, treasurer, and twelve councillors constitute the town-council. The parish church, a substantial stone building, was erected in 1784. St. Andrew's Cathedral, which was formerly used as the parish-church, but of which only a small portion is now standing, was a very elegant edifice. It is supposed to have been dedicated by Jocelin, bishop of Glasgow, who died in 1199. It was converted into a stable by Cromwell's soldiers, by whom also the roof was demolished.

The bridge, which here crosses the Tweed, consists of five stone arches in the channel of the river, and three smaller arches on dry ground, for carrying off the water when the river overflows its banks. Till 1834 its width did not exceed 7½ feet. Since then it has been widened to 22 feet, at an expense of 1000l. Four fairs are held annually for the hiring of servants and the sale of cattle. The population of the burgh and parish of Peebles, in 1831, was 2750.

(*New Statistical Account of Scotland*; Findlater's *Account of the Agriculture of Peebleshire*, 8vo., Edinb., 1802; Pennecuik's *Description of Tweeddale*, 4to., Edinb., 1715; Grose's *Antiquities of Scotland*, 4to., London, 1791; Forsyth's *Beauties of Scotland*; *Parliamentary Papers*, &c.)

PEELE. [MAN, ISLE OF.]

PEERS OF THE REALM are persons in whom inhere certain high dignities with privileges appurtenant. Without meaning to decide the question whether the lords spiritual are in strictness of speech peers of the realm, the persons who fall under this description are the dukes, marquesses, earls, viscounts, and barons, and this without reference to the accident of age, an earl being as much a peer of the realm, though a minor, and consequently not admissible to some of the high privileges of his order. Ladies may also in certain cases be peeresses of the realm in their own right, as by creation, or as inheritors of baronies which descend to heirs general. The wives of peers are peeresses of the realm, and entitled, in consequence of the rank, to certain privileges.

Under the several articles DUKE, MARQUIS, EARL, VISCOUNT, and especially BARON, will be found certain observations pertaining to each distinct order of peers. On the remote origin of this order of persons, and of the privileges belonging to it, especially that great privilege of having a house, in which, in concurrence with the spiritual lords, they consider every proposal for any change in the laws and customs of the realm, and have an affirmative or a negative voice respecting it, and of being also the supreme court of judicature before whom appeal may be made from the judgment of nearly all inferior courts, great obscurity rests; as it does also on the whole of the early constitution and history of Parliament, of which the peers form so eminent a part. [PARLIAMENT.] The reports of the committee of the house of peers, which sat during several parliaments about the years 1817, 1818, and 1819, on the dignity of a peer of the realm, contain a great amount of information on these topics, but leave undecided some of the greater and more important questions connected with it.

It seems however now to be clearly established, as a part of the laws and constitution of the realm, that every peer, being of full age and of sound mind, is entitled to take his seat in the house of peers and to share in all the deliberations and determinations of that assembly; and that he has privilege (perhaps not very distinctly defined) of access to the person of the king or queen regnant to advise concerning any matter touching the affairs of the realm. These are great and eminent privileges, but they are accompanied by others which illustrate the great consequence and deference which the constitution of England allows to the possessors of this dignity. If charged with any crime, they shall not be subject to the ordinary tribunals, but the truth shall be examined by the peers themselves; they shall not be arrested in civil cases; a peer's affirmation on honour is sometimes accepted where in ordinary cases an oath is required; and scandals concerning them are peculiarly punished.

It is now also clearly established that the crown may at its pleasure create a peer, that is, advance any person to the dignity, and to any one of the five orders; but that when once advanced the peer cannot be deprived of the dignity or any of the privileges connected with it, except on forfeiture of the dignity in due course of law, and the dignity must descend, on his death, to others (as long as there are persons within the limitation of the grant), with all the privileges appurtenant to it, usually to the eldest son, and the eldest son of that eldest son in perpetual succession, and so on, keeping to the eldest male representative of the original grantee. Some deviation from this rule of descent however has occasionally occurred, special clauses having been introduced into the patent, which is the writing by which the crown declares its will in this particular, limiting the descent of the dignity in a particular way, as in the case of the creation of Edward Seymour to the dukedom of Somerset, in the reign of Edward VI., when it was declared that the issue of the second marriage of the duke should succeed to the dignity in preference to the son of a former marriage. But generally, and perhaps universally for the two last centuries, the descent of a dignity (cases of baronies in fee, as they are called, being now for a moment excluded) has been to the next male heir of the blood of the person originally ennobled; sometimes with remainders to the next male heir of his father or grandfather. There is an instance in the reign of Charles I. of a dignity of peer of the realm being granted to a person (a Lucas) and the heirs male of his body, with remainder to a brother and the heirs male of his body, with remainder to one who was an illegitimate son of the father of the grantee, and therefore, in the eye of the law, not of the blood of the grantee and the heirs male of his body.

Indeed, it being at the pleasure of the crown that these dignities originate, it is not surprising that variety should be found in the manner in which the crown has declared its intention, and precedents should be producible for deviations from the usual course. The point is of some importance, since the question is from time to time raised, whether it might not be expedient that the ranks of the house of peers should be replenished by persons who are created peers for their lives only.

It has not unfrequently happened that the crown has granted the dignity of the peerage to a person, with remainder to the female issue or to the female kindred of the grantee and their heirs, as in the case of the Nelson peerage. In these cases it has generally happened either that the party had no male issue to inherit, and that the other males of the family were also without male issue, or that there was already a dignity inheritable by the male heir of the party on whom a new dignity was conferred to descend to his female issue.

The peers who possess what are called baronies in fee are the descendants and representatives of certain old families for the most part long ago extinct in the male line, but which had in their day summons to parliament as peers, and whose dignity it has been assumed descended like a tenement to a daughter, if only one daughter and heir, or to a number of daughters as coheirs, when there was no son. This principle has been so often recognised, that it may be regarded as a part of the constitution of the peerage, and in virtue of it, if A. die seised of a barony in fee, leaving B. a daughter and only child and M. a brother, the dignity shall inhere in B. in preference to M., and shall descend on the death of B. to her eldest son. In case A., instead of leaving B. his only daughter, leave several daughters, B., C., D., &c., and no son, the dignity shall not go to M., but among the daughters; and since it is imparticipable, it is in a manner lost as long as those daughters, or issue from more than one of them, exist. But should those daughters die with only one of them having issue, and that issue a son, he shall inherit on the death of his aunts. This is what is meant by the dignity of a peer of the realm being *in abeyance:* it is divided among several persons, not one of whom possessing it wholly, none of them can therefore enjoy it. [PARCENERS.] But the crown possesses the power of determining the abeyance, that is, it may declare its pleasure that some one of the daughters or the eldest male representative of some one of the daughters shall possess the dignity, as would have been the case had there been a single daughter only; and in case of an heir thus entering into possession of the dignity, he shall take that precedence among the barons in the house of peers which belonged to the family of whom he is the representative. A female who is only a coheir of a coheir may also have the abeyance determined in her favour. This was lately the case with Mrs. Russell, now baroness De Clifford. It is out of this privilege of the crown that the peerage cases arise of which there are some before the house of lords in almost every session of parliament. A party sees reason to think that the crown may be induced to determine a certain abeyance in his favour, if he can only prove that he is the representative of one of the coheirs. This proof, which is often a troublesome and expensive process, inasmuch as it may be necessary to go back into the fourteenth or fifteenth century, is to be made to the satisfaction of a committee of privileges of the house of peers, and on the report of such committee that the claimant has shown himself in a satisfactory manner to be the proper representative of the blood of one of the coheirs of one of these antient baronies, the crown has of late years [illegible] yielded to the reasonable request. In fact, without this, in a country like ours, where lands often descend to female heirs, it would be difficult to maintain a really antient nobility.

Many of the peers who belong to the higher orders of nobility have baronies in fee inherent in them; so that if A., one of them, die, leaving a daughter being an only child, and a brother, the brother shall take the superior title, and the barony descend to the daughter and the heirs of her body. An eldest son of a peer enjoying a barony and a superior dignity is sometimes called to the house of peers in his father's barony. When this is done, it is by writ of summons without a patent of creation (it not being in fact a creation of a new dignity, but only in [illegible] of the son's possession of it), and this is the case when a barony is taken out of abeyance.

Thus the English portion of the house of peers, [illegible] of lords, for they are terms used in precisely the same sense, are the lords spiritual, that is, the archbishops and bishops, and the lords temporal, who are of one of the five orders (though many of the dukes possess dignities of [illegible] inferior kinds also, and their ancestors may have long had seats in that house in those inferior dignities before the family was raised to the dukedom; and there are other persons who have been created peers by the crown, who have been admitted into the peerage by favour of the crown in virtue of the determination of an abeyance, or who have inherited the dignity from some ancestor on whom it had been conferred.

The fullest information on all points connected with the archaeological part of this subject is to be obtained from the Reports of the Committee of the House of Lords before referred to. Biographical accounts of the more eminent of the persons who have possessed these dignities are to be found in that very valuable book, Dugdale's 'Baronage of England.' In 1709, Arthur Collins, a London bookseller, published in a single volume an account of the peers then existing and their ancestors, a work of great merit. The demand for it appears to have been great, as it was followed by other editions in quick succession. It assumed a higher character in 1735, when it appeared in four handsome octavo volumes, great additions having been made to every article. From that time there has been a succession of editions, each professing to be improvements on the preceding, and each bringing up the state of the peerage to the time when the work was printed. The best of these, which is in nine bulky octavo volumes, was published under the superintendence of Sir Egerton Brydges. But as titles become extinct, and consequently the families bearing them are left out of the peerage-books, those who wish to possess a complete account of these eminent persons must procure many of the earlier editions of the work, as well as that which, being the latest, will for the most part be called the best. There are certain minor works giving the genealogical details of the descent of the dignities, which are published almost every year.

PEEWIT. [Plovers.]

PEGANUM, from *Peganon*, the Greek name of Rue, of which three kinds are described by Dioscorides,—the garden, the mountain, and the wild. The last is said to be called *moly* in Cappadocia and Galatia, and by some *harmala*. It is remarkable that even in the present day a plant is found in the north of India, the Punjab, and Caubul, which is called *hurmul* by the natives of the above countries, and sometimes distinguished in India by the name of *Lahouree hurmul*, indicating that it was introduced from the direction of Lahore. The Persian works on materia medica in use in India give *moly* as its Greek name, according to Dr. Royle (*Illustr.*, p. 155). It is interesting to find that the plant to which these names are assigned by the natives of the country, is the *Peganum Harmala* of botanists, a fact which shows that the investigations of the West had arrived at the same conclusion as those in the East respecting the plant alluded to by Grecian authors; and this enables us to put more faith in the results of such investigations than is sometimes done. The plant which is called Syrian Rue in gardens belongs to the natural family of Rutaceae, and is of easy culture in any light soil. The seeds which were formerly in use in medicine in Europe still are so in the East, but are not possessed of any peculiar or very active properties.

PEGA'NIA. [Pulmonaria.]

PEGASUS, one of the old constellations, called by Aratus (and also by Hyginus) simply the Horse. The mythological accounts of Pegasus (a son, it was said, of Neptune and the Gorgon Medusa, though how with such parentage he came to be a horse is not stated), the creator of the fountain Hippocrene at one kick, are more than usually unconnected, and the constellation is not a whole horse, but only the head, fore legs, and shoulders, to which a pair of wings is attached; nor is there any fountain near the place, except that with which Aquarius feeds one of the fishes. The figure of Pegasus is inverted, the head being farther from the north pole than the body: the constellation is surrounded by Cygnus, Equuleus, Aquarius, Pisces, and Andromeda. There are three bright stars, α (or Markab), β (or Scheat), γ (or Algenib), which form a quadrangular figure with α Andromedae, such as cannot be mistaken when the latter constellation is known. Moreover, a line drawn through α and β points to the pole star, in a line which produced passes through the pointers of the Great Bear.

The following are the principal stars:—

Character. ( ) not in Bayer.	No. in Catalogue of		Magnitude.	Character. ( ) not in Bayer.	No. in Catalogue of		Magnitude.
	Piazzi. (Hours.)	Astron. Society.			Piazzi. (Hours.)	Astron. Society.	
(a)	1	2514	4	ξ	46	2720	5
(f)	2	2530	6	λ	47	2722	4
	3	2563	6	μ	48	2727	4
(T¹)	4	2565	6	ν	49	2731	6
	6	2564	6½	ρ	50	2740	6
(T²)	7	2574	6		51	2742	6
ι	8	2576	5		52	2743	6
(g)	9	2551	4½	β	53	2753	2
κ	10	2583	4	ο	54	2755	9
	11*	2589	6	(l)	55	2760	5
(W)	12	2588	6	(k)	56	2761	5½
	13	2596	6	(m)	57	2767	6
—	14	2597	6	(p)	59	2769	5½
	15	2601	6		60	2770	6
(B)	16	2603	6		61	2773	6
	17	2605	6	τ	62	2787	6
(A)	18	2609	6		65	2790	6
	19	2611	6		66	2791	6
	20	2612	6	υ	68	2794	6
(b)	21	2617	5		69	2800	6
ν	22	2620	5	(q)	70	2803	5½
	23	2624	6	(s)	71	2811	6
ι	24	2626	4	(r)	75	2820	6
	25	2628	6½		76	2831	6
θ	26	2634	4	(O)	77	2832	6
π¹	27	2636	5	(t)	78	2834	5½
	28	2638	6½		79	2846	6
π²	29	2637	4½		80	2851	6
	30	2662	6	φ	81	2855	6
(d)	31	2665	4½		82	2856	6
(C)	32	2666	6	ψ	84	2863	6
(H¹)	34	2680	6		85	2871	6
(H²)	35	2689	6	(h)	86	2875	5½
(H³)	37	2697	6	(n)	87	3	6
(K)	39	2693	6½	γ	88	13	2
(Q¹)	40	2702	6	χ	89	14	6
(Q²)	41	2706	6½		(10)	2641	6
ζ	42	2719	3		(114)	2541	6
ο	43	2711	5		(120)	2544	6
η	44	2716	3		(241)	2733	6
	45	2719	6½				

PEGU was a century ago a powerful empire in the peninsula without the Ganges. The nation which established this empire is called Peguans by the Europeans, and Taleins by the Birmans; but they call themselves Mon. They inhabit the low country which extends on both sides of the river Irawaddy, from its mouth to the Galladyet Mountains (from 16° to 18° 30′ N. lat.), and from the banks of the Saluen river to the mountains of Aracan. Having attained a higher degree of civilization than most of the neighbouring nations, they extended their conquests northward along the banks of the Irawaddy, and subjected the Birmans. But this numerous and warlike people rose against them and overturned their empire. Their capital, Pegu, was taken by Alompra in 1757, every private dwelling was razed to the ground, and all the inhabitants dispersed or led into captivity. The successors of Alompra however built a new town on the same spot, which was visited in 1795 by Colonel Symes. The extent of the antient town was accurately traced by Colonel Symes by the ruins of the ditch and the surrounding wall. It appeared to have been a quadrangle, each side measuring a mile and a half. The new town occupied about one half of the area of the old town, and was fenced round by a stockade from 10 to 12 feet high; on the north and east sides it bordered on the old wall. There was then only one main street running east and west, crossed at right angles by two smaller streets. The streets were spacious and well paved with bricks, which the ruins of the old town plentifully supplied. On each side of the streets was a drain to carry off the water. The houses, according to the custom throughout the Birman empire, are raised either on wooden posts or bamboos of different heights, according to the size of the building. The *kioums*, or monasteries, and the habitations of the higher ranks, are usually elevated six or eight, and those of the lower classes from two to three feet. They are composed wholly of bamboos and mats, or sheathing boards, and indifferently thatched. No brick buildings are permitted to be erected, except those which belong to the king or are dedicated to Gaudama. It is feared that if the people were allowed to build brick houses, they might erect brick fortifications, and thus endanger the security of the state.

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* [illegible] to be marked by [illegible].

The numerous temples were spared when Alompra destroyed the town. The most famous is the Shoe Madou (the Golden Dwelling of the God), which is 361 feet high, and consists of two terraces and a steeple. The lower and greater terrace is about 10 feet above the natural level of the ground, and forms an exact parallelogram. The upper or lessér terrace is similar in shape, and rises about 20 feet above the lower terrace. Each side of the lower terrace is 1391 feet, and of the upper 684 feet. The terraces are ascended by flights of stone steps, and on their sides are the dwellings of the rhahaans, or priests, made of boards and covered with tiles. The steeple, which is properly called the Shoe-Madou, is a pyramidal building composed of brick and mortar, without excavation or aperture of any kind. It is octagonal at the base and spiral at the top. Each side of the base measures 162 feet. This immense breadth diminishes abruptly, and the whole building may be compared in shape to a speaking-trumpet. A great variety of mouldings and ornaments in stucco encircle the building on all sides, and the whole is crowned by a *tee*, or umbrella of open iron-work, from which rises a rod with a gilded pennant. The circumference of the tee is 56 feet. Round the lower rim of it are hung a number of bells, which, when agitated by the wind, make a continual jingling. The tee is gilt. All the lesser pagodas of the town are ornamented with umbrellas of similar workmanship, which are likewise encircled by small bells.

The priests inhabit groves, in which they build their kioums, or monasteries, and instruct the boys in reading, writing, and the moral and religious duties, without receiving any remuneration, except some rice or other necessaries. The only article of consequence manufactured at Pegu is silk and cotton cloth, which the women weave with considerable skill; but no more is made than is sufficient for home consumption.

This town, which is called Bagó by the natives, is situated about 17° 40′ N. lat. and near 96° E. long., and is built on the eastern banks of a navigable river, which, about 90 miles below the town, joins the eastern or Syrian branch of the Irawaddy about 3 miles below the town of Rangoon. The tide seems to ascend in the Pegu river to the town, but at the time of Symes's visit it had no commerce.

(Symes's *Account of an Embassy to the Kingdom of Ava.*)

PEINE FORTE ET DURE. The 'strong and hard pain,' which is denoted by these words, was a species of torture used by the English law to compel persons to plead when charged judicially with crimes less than treason, but amounting to felony. It was applicable whenever the accused stood mute on his arraignment, either by his refusal to put himself upon the ordinary trial by jury, or to answer at all, or by his peremptorily challenging more than twenty jurors, which was a contumacy equivalent in construction of law to actually standing mute. This proceeding differed essentially from the 'quæstio' in the Roman law, and the torture which generally prevailed in Europe, and which, as connected with the royal prerogative, was also practised in England for several centuries, inasmuch as its object was to force submission to the regular mode of trial prescribed by the law, and not to compel testimony or the confession of a crime.

Much difference of opinion has existed upon the question whether the practice of the peine forte et dure originated with the statute usually called the Statute of Westminster 1 (3 Edw. I., c. 12), or whether it was in use at an earlier period. The latter opinion is maintained by Coke and Hale, but the former is adopted by Staundforde, Blackstone, and Barrington. In a note to Hale's 'Pleas of the Crown,' vol. ii., p. 322, Emlyn says that although the Statute of Westminster 1 speaks of this punishment rather as a thing already known than as a new introduction, there is no notice taken of it in any antient author, book-case, or record before the reign of Edward I.; and, on the contrary, he cites two curious records in the reign of Henry III., from which it appears that persons at that time arraigned for felony, and standing mute, were not put to the peine forte et dure, but had judgment to be hanged. Upon this point it is worthy of remark that the statute of Edward I. merely directs that 'such persons as will not put themselves upon inquests of felonies at the suit of the king shall be put into hard and strong prison (*soient mys en la prisone fort et dure*), as those which refuse to be at the common law of the land;' whereas the judgment of the peine forte et dure, as given in antient books, contained many particulars of suffering to be imposed on the contumacious prisoner, not mentioned in the statute. Fleta, who must have written about ten years after the date of the statute, describes the judgment to be, that 'the party shall be cast into prison and lie upon the bare ground clothed with a single garment and barefooted; that he shall have for his food only three morsels of barley-bread in two days; that he shall not have food every day, but only on alternate days; that he shall not drink every day, but that on the day when he shall have no food, water shall be given him to drink.' (Fleta, lib. [illegible] cap. 34.) It certainly seems improbable that all these circumstances should, within a very few years, have been added to the judgment warranted by the statute, if the statute had really been the origin of the practice. Mr. Reeves has plausibly suggested that the only object and effect of the statute was to apply the same compulsory process to those who refused to submit themselves to trial by jury in indictments at the king's suit, which had been previously in use to compel persons to put themselves upon antient methods of inquiry, namely, the duel, the ordeal, or the wager of law. (*History of the English Law*, vol. ii., p. 137.) The trial by jury had no doubt been much encouraged during the reign of Henry III., in opposition to the barbarous modes of trial previously used; and it is therefore by no means improbable that this statute should have contemplated the promotion of this great judicial improvement. The language of the enactment also is entirely consistent with the view of its object suggested by Mr. Reeves. On the other hand it must be acknowledged that the instances above mentioned, as cited by Emlyn, and the total silence of Glanville and Bracton, as well as of the judicial records anterior to the statute respecting such a mode of enforcing submission to the law, are adverse to this interpretation. The origin of this rude proceeding must therefore be considered as uncertain.

It appears from Fleta, and also from Britton (cap. [illegible]) that the punishment in the reign of Edward I., when the first traces of it in the history of English law appear, consisted merely of severe imprisonment, with a diet barely sufficient to prevent starvation, until the offender repented of his contumacy and consented to put himself upon his trial. A curious charter of pardon in the 31st Edw. III. (1357), published in Rymer's *Fœdera*, vol. vi., p. [illegible] recites that a woman indicted for the death of her husband, having stood mute, had been adjudged 'ad pœnam suam, ut dicitur, in quâ sine cibo et potu in artâ prisonâ per quadraginta dies vitam sustinuit viâ miraculi et quasi contra naturam humanam.' It appears therefore that at that time the sentence continued to be imprisonment only, and did not authorise the infliction of any further violence. Shortly afterwards however the practice of loading the sufferer with weights and pressing him to death appears to have become the regular course. In the 'Year Book,' 8 Henry IV. (1406), the judgment upon persons standing mute, as approved by advice of all the judges, was 'that the marshal should put them in low and dark chambers, naked except about their waist; that he should place upon them as much weight of iron as they could bear, *and more*, so that they should be unable to rise; that they should have nothing to eat but the worst bread that could be found, and nothing to drink but water taken from the nearest place to the gaol, except running water; that the day on which they had bread they should not have water, and *e contrâ*; and that they should lie there till they were dead.' Thus, although the reporter states in this case that the judgment was formerly different, the punishment now became capital, a lingering and painful death being enjoined instead of severe imprisonment to extort submission. There is no trace of any statute or royal ordinance, or of any authority besides this judicial resolution to justify a change in the mode of proceeding so material as to affect the life of the party. The form by which it was denoted was also changed from *prisone* in *peine forte et dure*; and from this period, for more than three centuries, until it was virtually abolished by the stat. 12 *Geo.* III., c. 20, (1772,) *pressing* to death continued to be the regular and lawful mode of execution for criminals who stood wilfully mute upon their arraignment for felony. The press-yard at Newgate at the present day retains its name as derived from this barbarous practice.

Blackstone, after alluding to 'the doubts that were conceived of its legality,' and 'the repugnance of its theory to the humanity of the laws of England,' states that the peine forte et dure was rarely carried into practice. (*Commentaries*, vol. iv., p. 325.) It is probable that it was not of frequent occurrence, because with this fearful punishment for contumacy before their eyes, men would naturally for the most part (as Hale says) 'bethink themselves and plead.' It is however repeatedly mentioned in the Year Books as an existing proceeding; it is stated as the law of the land by Staundforde, Coke, Hale, and Hawkins, in their several treatises on the Criminal Law, and the number of the recorded instances in which it is directly or incidentally mentioned seems to shew that it was much more prevalent than has been commonly supposed. The motive of the prisoner in standing mute and submitting to this heavy punishment was to save his attainder, and prevent the corruption of his blood and consequent forfeiture of his lands in case he was attainted of felony. In the 21st of Henry VI. (1442), Juliana Quicke, who was indicted for high treason in speaking contemptuous words of the king, had the peine forte et dure because she would not plead (Croke's *Charles*, 118); in the margin of an inquisitio post mortem of Anthony Arrowsmith, in the 40th of Eliz. (1598) are the words 'Prest to death' (Surtees's *History of Durham*, vol. iii., p. 271); and in 1659, Major Strangeways was tried for the murder of John Fussell before Lord Chief-Justice Glynn, and, refusing to plead, was pressed to death in Newgate. In the pamphlet which very minutely narrates the particulars of this execution, it is stated that the prisoner died in about eight minutes, many people in the press-yard humanely casting stones upon him to hasten his death. (Barrington's *Antient Statutes*, p. 85, note.) In still more recent times it appears from the Old Bailey Sessions Papers that at the January Sessions in 1720, one Phillips was pressed for a considerable time, until he begged to stand his trial; and at the December Sessions, 1721, Nathaniel Haws continued under the press with 250lbs. for seven minutes, and was released upon his submission. Mr. Barrington says that he had been furnished with two instances in the reign of George II., one of which happened at the Sussex assizes before Baron Thompson, and the other at Cambridge, in 1741, when Mr. Baron Carter was the judge. (Barrington's *Antient Statutes*, p. 86.) In these later instances the press was not inflicted until by direction of the judges the experiment of a minor torture had been tried by tying the culprit's thumbs tightly together with strings. It is said in Kelyng's *Reports*, p. 27, to have been the constant practice at Newgate in the reign of Charles II., that the two thumbs should be tied together with whipcord, that the pain of that might compel the culprit to plead. The adoption of this course was no doubt dictated by merciful motives, and was intended by the judges to prevent the necessity of having recourse to the peine forte et dure; but it was wholly unauthorised by law. The practice was finally discontinued in consequence of the statute 12 Geo. III., cap. 20, which provides that every person who shall stand mute when arraigned for felony or piracy shall be convicted of the same, and the same judgment and execution shall be awarded against him as if he had been convicted by verdict or confession.

PEIPUS, Lake. [RUSSIA.]

PEIRESC, NICOLAS CLAUDE FABRI DE, a counsellor of the parliament of Aix, was born at Beaugensier, in Provence, December 1, 1580. His father, Renaud de Fabri, was a counsellor of the court of aides. He received his earliest education among the Jesuits at Avignon, whence he was removed to Aix in 1595. It was during this period that his father being presented with a coin of the emperor Arcadius, found at Beaugensier, young Peiresc begged to have it; and being delighted at finding that he could decypher the inscriptions, carried it to his uncle, who gave him two more, together with some books upon medals. This incident led him to the study of antiquities, in which he afterwards distinguished himself.

In 1599 he visited Italy, in the various cities and countries of which he spent nearly three years. In 1604 he took the degree of doctor in law at Aix. In 1605 he accompanied Duvair, the first president of the parliament of Aix, to Paris, where he formed an acquaintance with De Thou, Isaac Casaubon, Papire Masson, Nicolas le Fevre, the brothers St. Marthe, Bongars, and Francis Pithou; and in the following year came in the suite of La Boderie, the French ambassador, to England, where he was graciously received by King James. He visited Oxford; and formed an intimacy with Camden, Sir Robert Cotton, Sir Henry Savile, and other learned men. From England he passed over to Holland, and through Antwerp and Brussels back to Paris.

In 1618 he procured a faithful copy and published a second edition of the 'The Acts of the Monastery of Maren in Switzerland,' in defence of the royal line of France against the title of succession of the Austrian family to the French crown.

Peiresc was a liberal patron of letters; Bayle gave him the title of 'le procureur général de la littérature;' and the authors of his life shew how imperfect the labours of Scaliger, Holstenius, Saumaise, Sicard, and Kircher would have been, unaided by the literary treasures which he procured for and presented to them. It was at his instigation that Grotius undertook his great work 'De Jure Belli et Pacis.'

The multiplicity of his engagements and the extent of his correspondence prevented Peiresc from finishing any considerable work. He left behind him, besides some of his own composition, a great number of manuscripts, antient and modern, on local history and antiquities, mathematics, astronomy, the medallic science, languages, &c. A catalogue of these, in number more than seven hundred, is preserved among Sir Hans Sloane's Manuscripts in the British Museum, No. 707.

Of his writings there have been published forty-eight Italian letters addressed to Paul and John Baptist Gualdo in the 'Lettere d'Uomini Illustri;' a considerable number among those of Camden published by Smith; and a long and learned dissertation on an antient tripod found at Frejus in the 'Mémoires de Littérature et de l'Histoire,' by Desmolets, in 1731. A considerable number of Peiresc's inedited letters were of late years communicated from time to time to M. Millin for his 'Magazin Encyclopédique,' by the president Fauris de Saint Vincens, who again published them separately, in five different tracts or portions, 8vo., Paris, 1815.

Peiresc died in the arms of his principal biographer, Gassendi, June 24th, 1637. He is stated to have purchased more printed books than any man of his time, yet the collection which he left was far from large. As fast as he purchased books and manuscripts, he made presents of them to learned men, to whom he knew they would be useful. His remaining library was purchased by the Collége of Navarre.

(*Vita Nic. Claudii Fabricii de Peiresc*, à Petro Gassendi, 4to., Par., 1641, transl. into Engl. by W. Rand, 8vo., Lond., 1657; Moreri, *Dictionn.*; Chalmers's *Biogr. Dict.*, vol. xxiv., p. 252-257; *Biographie Universelle*, tom. xxxiii., p. 254-261.)

PEKEA is the name given by botanists to a plant inhabiting Guiana, and furnishing the Saouari or Sawarra nuts of the shops, a very different fruit from that to which the name of Saouari is given in Guiana. This Pekea comprehends two species, the *butyrosa* and *tuberculosa*: the former is unknown in this country; the latter, which yields the fruit in question, is a very large tree inhabiting the woods of Guiana, where it is called Tata-youba by the Garipon Indians. It has opposite digitate leaves, whose leaflets are oval, smooth on the upper side, but white with down beneath; the terminal leaflet is said to be 8 inches long by 3½ in breadth, while those at the sides are much smaller. The flowers are unknown. The fruit consists of greenish compressed drupes, which adhere around a common centre, and contain a single seed of large size, covered with a brownish rugged woody shell, and containing a kernel of a soft consistence, and of the most delicate buttery quality. It is by far the best of the South American nuts that are brought to England, and much superior to our own walnuts, almonds, and filberts; but it is scarce and dear in most seasons.

Pekea tuberculosa.

PEKING, the capital of the Chinese empire, is situated near 40° N. lat. and between 116° and 117° E. long., in a level plain, which on the west of the town assumes an undulating surface, and at some distance from it rises into low hills. It is about 80 miles distant from the Great Wall.

The city consists of three parts: the Zin-tcheou, or City of the Throne; the Wailo-tcheou, or External town; and of twelve suburbs. The first is also called the Town of the Tartars, as the inhabitants are of Mongol or Mantchoo extraction; and the second, the Town of the Chinese, being entirely inhabited by Chinese. These two cities are enclosed by walls, the circumference of which is 58 li, or about 17 English miles. The suburbs extend on the east, south, and west of the walls. The walls are about 40 feet in height, and surmounted by a parapet deeply crenated, but without regular embrazures; the merlons contain loop-holes for archers. The thickness of the walls is about 20 feet at the base, and 12 across the terrepleine upon which the parapet is erected. The outside of the walls, though not perfectly perpendicular, is smooth, but the inside has a considerable bevel, the rows of bricks which form it being placed like steps, one above and behind the other, like the steps on the faces of the Great Pyramid of Egypt. In some parts there are slopes of earth, on which the cavalry can ascend the walls, on which several horsemen can ride abreast. The walls are flanked on the outside by square towers, at about sixty yards distance from each other, and projecting 40 or 50 feet from the curtain between them. Sixteen gates lead to the town. Over each gate is a watch-tower, nine stories high, and in each story are port-holes for cannon. The lowest story forms a large hall for the officers and soldiers on guard. Round the gate, on the outside, is a semicircular wall, enclosing a space about 360 feet long, which serves for a parade. In this semicircular wall there is a lateral gate, by which the troops can enter the parade without marching on the high road. A wall of less dimensions separates the Zin-tcheou from the Wailo-tcheou.

The roads leading to the city are paved with blocks of granite; the streets are not paved, but are constantly watered to keep down the dust. The principal streets vary from 140 to 200 feet in breadth, but they contain no large buildings; the houses are usually not higher than one story, and few have two stories. The streets are lined with a continuous series of shops, in which the goods are laid out with great order. The wooden columns in front of the shops are painted red, blue, and sometimes are gilt. In several places triumphal arches cross the streets. They are built of wood and consist of three handsome gateways, of which the middle is the highest and largest, and over them are three roofs richly decorated. Public edifices and also the dwelling-houses of private persons occur only in the narrow streets and lanes. Where these lanes open into the [illegible] streets there are generally gates, which are shut at night and opened only in case of need. The private dwellings do not embellish the town, as they are separated from it by walls or curtains, to prevent passengers from seeing the court into which the street-door opens. They are built of bricks, and have a roof of grey tiles.

No navigable river flows near the city. A narrow canal, called Yu-ho (imperial canal), runs through the town, but the waters are only used to feed the canals and ponds of the imperial palace. The inhabitants have wells, the water of which is however brackish, and wealthy persons procure water from wells without the town, especially from those on the north side, which are famous for their excellent water.

The buildings belonging to the emperor, as well as the temples and altars, have roofs consisting of four slopes, but all the other buildings have only two slopes. The imperial buildings are covered with yellow tiles, those of the princes with green tiles, and all the other houses with grey tiles. The temples not belonging to the emperor, and also the convents, are mostly painted red. Peking contains a great number of palaces and temples, decorated with numerous works in marble, but a considerable portion of the area of the town is occupied by squares, gardens, ponds, and even fields.

The Zin-tcheou, or City of the Throne, consists of three parts, enclosing one another. In the centre is the imperial palace, called Zun-zin-tcheou, which has the form of an oblong rectangle, and is surrounded by a high wall painted yellow, and hence called the Yellow Wall. It is about two miles and a half in circumference, and contains, in addition to several residences of the emperor, some public buildings and magazines, also extensive gardens, with canals, ponds, and fountains, planned and executed with taste. The Zun-zin-tcheou is surrounded by the Kuan-tcheou, the Imperial Town, which is seven miles and a half in circumference, and contains, among other remarkable buildings, the temple of Fo, or Shigemuni, with a statue of the god [illegible] of copper and gilt, which is more than 60 feet high. In this part of the Zin-tcheou there is a fine square called Zin-shang, near which is a beautiful hill, called Zin. The Kuan-tcheou is enclosed on all sides by what is more especially called the City of the Throne, or Zin-tcheou, in which the university buildings and those of the Russian mission are situated. The whole city is ten and one-sixth li in length, and is nine and five-sixths li wide. It is considered as a military encampment, and divided among the eight divisions of the Mantchoo troops, which are stationed there. The imperial palace does not belong to those eight sections.

The Wailo-tcheou, or Town of the Chinese, is properly only a suburb, and has been enclosed with walls only on account of the two principal altars which it contains, and on which the emperor presents his offerings. These are the Tien-tan, or Eminence of Heaven, which is round, and [illegible] two miles in circumference, and the Tee-tan, or temple dedicated to the earth, which is a square, because the ancient Chinese considered the earth to be of a square form. Within the walls enclosing the second temple, and which has a circumference of about two miles and a half, is the field on which the emperor himself every year goes to plough. In this part of Peking are the theatres, and other places of amusement, as baths, &c. It extends along the southern side of the Zin-tcheou, and is somewhat longer, but not quite so wide. It contains two Catholic convents and a mosque. In one of the suburbs east of the town is the convent of the Choshanes, in the steeple of which is a very large bell weighing nearly 1400cwt., which is heard in all parts of the town when it is rung.

The population of Peking was estimated by Staunton at three millions, but Père Hyacinthe makes it only two millions. This cannot be considered as a great population when the immense extent of the Chinese empire and its wealth are considered. Staunton, in comparing Peking with the large towns of Europe, says, 'Peking is merely the seat of government of the empire,—it is not a port. It is not a place of inland trade or manufacture. No representative diet or general states assemble there to assist, or check, or examine the measures of the crown. It forms no rendezvous for pleasure and dissipation. The chief cities of Europe owe much of their opulence, size, and population to the influx of those persons who, by the gift of their progenitors or by the favour of their prince, possess wealth without labour, and seek, in the concurrence of multitudes, for opportunities to enjoy it to the most advantage. But Peking owes little of its extent or populousness to circumstances of this nature. Most of those there have their stations regularly allotted to them, or are occupied in attending or providing for those who have. Except perhaps some of the relations of the emperor, few indeed are those whose only business is the pursuit of pleasure and the consumption of that time which others are under the necessity of employing in the performance of some public duty and in the private cares of living.'

Peking, being the seat of government, contains the great offices for the administration of the empire, which are situated, for the sake of convenience, near the southern gate of the imperial palace. The most remarkable of them is the office called Li-pou, the business of which is to consider the qualifications of the different mandarins for various offices, and to propose to the emperor their removal when they are found incapable or dishonest. The office of ceremonies, called Li-pou, has for its object the preservation of the customs or morals of the empire; and the office of public censors has to take into consideration the effect of existing laws, the conduct of the other offices, of the princes and great officers of state, and even of the emperor himself. The garrison of the town is estimated at 80,000 men.

(Du Halde's *History of China*; Staunton's *Account of an Embassy to the Emperor of China*; and *Description de Péking, traduite du Chinois en Russe par* P. Hyacinthe, *et du Russe par* F. de Pigny, Petersburg, 1829.)

PELA'GIA. Lamouroux gives this name to a small coral from the Caen oolite, ranked by Blainville among MILLEPORIDA.

PELA'GIA. [PULMOGRADA.]

PELAGIANISM, PELA'GIUS, REMONSTRANTS, and SEMI-PELAGIANS. The disputes in the earlier centuries of the Christian church, when first liberated from external violence and obloquy by its formal establishment, related to the fundamental dogma of the Trinity. Christian writers, when freed from this struggle for life, and from the task of drawing up apologies in defence of the dignity, consistency, and purity of the faith which they professed, were occupied until the commencement of the fifth century with stating and enforcing the Catholic doctrine on this head. This task accomplished by the leaders of the Eastern church (for whose speculative predilections a suitable field of labour seemed thus opened), a succession of controversies arose, of a blended dialectic and practical nature, and, for this reason, equally fitted to occupy the attention of the principal thinkers of the West. Such were the questions respecting grace, election, and predestination.

Whether the great Fathers of the church, anterior to the controversies of Augustin and Pelagius, had propounded sentiments which might be fairly considered as favourable to either party, is a doubtful question, and one, consequently, which has been the parent of much violent controversy. St. Augustin himself, as is well known, quoted the earlier fathers in support of his principles. But this asserted coincidence will hardly stand the test of a close examination. The case of St. Gregory of Nazianzum, whose sentiments were quoted by St. Augustin as identical with his own, will serve to illustrate this remark. St. Gregory of Nazianzum, according to the deliberate judgment of his biographer, was not so consistent as either Augustin or Pelagius. He appears to have held a mean between the doctrines of unqualified freedom, as laid down by Origen, and those of grace, as subsequently taught by Augustin. His theory, if carried out (for the germs only of a theory are to be found in his writings), would have led him in all probability, as an admirer of Origen, to the system of Pelagius rather than of Augustin. But precise dogmatic statements not being called for (as no theory on these subjects had been formally put forward), the sentiments of St. Gregory seem to have remained to the last an anticipation of what, in the days of the Reformation, would have been called Synergism.

This anticipated Pelagianism of the early fathers was laid as a heavy charge by some doctors within the church of England during the latter portion of the sixteenth century. We read that Elizabeth's studies in the Greek Fathers gave alarm on this ground. Hooker asks—'The heresy of free-will was a millstone about the Pelagians' neck; shall we therefore give sentence of death inevitable against all those Fathers in the Greek church who, being unpersuaded, died in the error of freewill?' Almost equivalent to this was the opinion of Jackson.

Extremes, and tendencies to extremes, beget, as is well known, the opposite errors. It may accordingly be objected to the early Anglican writers, that the remembrance of the errors from which they had been delivered was as yet too fresh to allow them to form an impartial judgment in a matter of such nicety. The opinion of a later Anglican writer may be admitted, as less exceptionable on this point, respecting the Augustinian or Pelagian tendencies of the early fathers:—

'The ancient Fathers of the church met this question, concerning the union of the Divine prescience with human freedom, wisely and most reasonably. They stood upon the proofs of God's prescience, which authentic and unambiguous prophecies supplied; they maintained the liberty of human action, without which they saw there could be no religion, and, whatever solutions or qualifications they attempted to give of the apparent difficulty subsisting in their view of the case, they sought no relief of it whatever by going to invalidate the one principle or the other—the prerogative of the Divine foreknowledge, or the responsible freedom of man's moral agency. Justin Martyr, Origen, Eusebius, all concur in this judgment, and even Augustin, when he argues most coolly, does not dissent from them.'* Previous to the fifth century, the moral incapacity and fallen condition of man, and the necessity of grace to change his nature and enable him to live aright in the sight of God, were admitted as doctrines of the church. But no controversy in connection with them having as yet arisen, they had not been treated so precisely as the subjects of the Trinity and the Divinity of Christ. The seeds of dispute may be plainly discerned in the statements put forward by various fathers on these important topics. The usual differences in tone between the theology of the Eastern and Western churches are to be observed in the course of these controversies:—the first, more directly philosophical, taking a paramount interest in the Trinitarian question; the second being chiefly directed to the effects of certain doctrines on human practice. To tax the Greek fathers with tenets equivalent to Pelagianism is unfair, although, according to Hooker and Jackson, they approached somewhat too nearly to it; but it would be an arduous task to establish their entire freedom from a leaning to that side. Such must ever be the case with regard to the recorded sentiments of the class of divines so happily designated as 'superstructure men,' whose mission was rather to set forth the fruits of a change of heart, than the means ordained of God to effect the change itself. Accordingly, some expressions of Clement of Alexandria, when speaking of the natural condition and powers of man, can be explained only by such means. The admiration of Origen evinced by Pelagius was perverted, by the jealousy of Jerome, into a proof of his heterodoxy. Anianus, a follower of Origen, employed himself during the period of his disgrace by translating some of the homilies of St. Chrysostom in order to establish the identity of the doctrines contained in them with those for which he suffered. On the other side, Tertullian and Cyprian, in Africa, and subsequently Hilary and Ambrose, asserted very different doctrines, the precursors of the controversy which at last broke out in the fifth century.

Pelagius, whose name has acquired so lasting a notoriety, was born, during the fourth century, in Britain. His ordinary appellation is a translation of that borne by him in his own country. He settled in Italy as a monk, and began to disseminate his peculiar doctrines in Rome, about A.D. 400. Accompanied by his friend and admirer Cœlestius (once an advocate, but subsequently a monk, and who from temper, talents, age, and the habits of his former profession, was better fitted to head a party than his aged and simple-hearted leader), Pelagius visited Africa and Palestine. After escaping censure from the council of Diospolis, he was subsequently condemned by Pope Zosimus (who had hitherto protected Cœlestius), and banished from Italy by an edict of the emperor Honorius, in 418. It is supposed that on his expulsion from his retreat in Palestine, which he was induced to select from the similarity of his own views with those of the Eastern church, he retired to his native country. Very little of his writings has come down to us.

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* Davison, p. 377 (1825).

'The Pelagians,' writes Hooker, 'being over-great friends unto nature, made themselves enemies unto grace, for all their confessing that men have their souls, and all the faculties thereof, their wills and all the abilities thereof, from God.' Pelagius himself, of a cold and passionless temperament, and removed from the bustle and vices of the world in the solitude of his cloister, had not gone through the fiery trials of St. Augustin. Although fully alive to the deadly evils of Antinomianism, he fell into an error equally pernicious, when he proposed to preach, as an antidote, the limitation of the sin of Adam (in its consequences) to himself, and the power of man to 'do good works pleasant and acceptable to God,' so as to merit eternal happiness, without the aid of divine grace. Not merely the culminating points of the system of Augustin, the doctrines of irresistible and absolute predestination, were repudiated by Pelagius, but the fundamental doctrines of the gospel, of the necessity of pardoning mercy and sanctifying grace, were degraded from their proper rank in the Christian scheme, and the Atonement deprived of its essential virtues. But Pelagius was better than his system; which, under different names, has been put forward in the church, with less in the character of those by whom it was propounded, to palliate their mischievous mistakes.

Differing so widely as did the systems of Pelagius and his great antagonist, it was not difficult to foresee that attempts at compromise would hardly be successful. The church of the south of Gaul was at that time in a flourishing condition, its leaders pious and learned, and an active ecclesiastical spirit pervaded the whole body. The first attempt to reconcile these contradictory dogmas, was made at Marseille. Its supporters were consequently designated as Semi-Pelagians. They agreed with St. Augustin, in that they ascribed (*generally*) a holy life *as such* to the grace of God; but on the other hand, they approached more nearly to Pelagius, as they attributed the beginning and end, or the commencement and sum of a course of acceptable actions to the force of human merit. Its internal character, as well as the circumstances under which it originated, contributed to give it some popularity, and to rank among its defenders the names of Cassian, and the better known one of Vincentius Lerinensis. But the orthodox belief found active champions in Hilary and Prosper. To the exertions of the latter the formal document of Pope Cælestinus condemnatory of Pelagian doctrines is principally attributable.

Subsequently to the decisions of the council of Orange in 529, the system of Augustin may be considered as the established standard of orthodoxy throughout the West. But the seeds of future discussion were contained in the authoritative declarations of the church, which were studiously couched in wide terms. And the subject of predestination was treated indirectly and in general expressions, with a view to avoid controversy. The doctrine of predestination to condemnation, it is to be observed, was expressly rejected. But this temporising policy for the hope of present security proved, as usual, the parent of weakness. Various attempts were made to turn the embarrassing doctrine of predestination. The most celebrated among these is that which arose during the ninth century, with which the name of the unhappy Gottschalk is connected. The condemnations, disgrace, and punishment inflicted on this unhappy man, in consequence of his ultra-Augustinianism with regard to the doctrine of predestination, which brought upon him the hostility of the ruling Semi-Pelagian party, are well known. It is manifest however, from several treatises by the most eminent theologians of the day, as well as the decisions of the various councils and synods held in connection with this affair of Gottschalk, that ecclesiastical and orthodox leanings were on the side of Augustin and his admirer.

Thus professedly Augustinian as the spirit of Catholic theology undoubtedly was, there arises a question—by what means did the antagonist principle of Pelagianism enter so largely and actively into the church system of the middle ages? Ignorance of the real principles of Augustin was one cause, which enabled the leading schoolmen to engraft their perversions upon his doctrines. For the Pelagianism of one great doctor of the middle ages, Duns Scotus, is clear and undoubted; and the leanings of another, St. Thomas Aquinas, pure and elevated as much of his teaching undoubtedly is, and Augustinian as he has often been deemed, are found, when closely regarded, to be at least Semi-Pelagian. Most close and natural was the connection between Pelagianism and the paramount attention bestowed by the schoolmen on speculative questions in morality, to which the interests of religion were often sacrificed. The naturalism of the system of Pelagius is well known. In this also some of the leading schoolmen were his followers. In their high and unbounded admiration of Aristotle, in whom they professed to discover the best and most eligible guide to Christian truth, they left, like Pelagius, the line of demarcation between Christianity and heathenism faint and indistinct.

The modern Arminians [ARMINIUS; DORT], called also in the first instance Remonstrants, and in more homely phrase, Free-Willers, correspond very nearly in doctrine with the Semi-Pelagians above mentioned. The following may be considered as a fair statement of their opinions:—1, God elects none to salvation but on account of that faith which he foresees in them. 2, Faith and sincere obedience are made the conditions of justification and salvation, just as Adam's perfect obedience would have entitled him to eternal life; and so God reputes this imperfect obedience as perfect, having relaxed the rigour of the law upon the account of Christ's satisfaction; that God sent him to die without any particular design to save any particular persons by it, but only to redeem all men in general, and now he applies salvation to all that believe and repent. 3, That Christ so far redeemed all men, that none shall be condemned for original sin, which they admit under such qualifications as almost to annihilate its effects. The doctrine of final perseverance they totally reject.

Mention has been made elsewhere of the wicked and cruel persecutions to which the Remonstrant party were subjected in consequence of the synod of Dort. It is beyond our present object to discuss the charge imputed to their principles, of leading to Socinianism. But few theological authors of that age are to be compared to Limborch and Grotius. The latter, with all his obvious faults, for a long period was regarded as the chief of Protestant expositors.

Another and important question remains behind, as to whether the supposed sudden influx of Semi-Pelagian or Arminian principles into the church of England during the earlier part of the seventeenth century is in any way attributable to the disgust conceived towards the contra-Remonstrant or Calvinist party, the victors at Dort, and the supposed better accordance of Arminianism with the high principles then held in church and state. Some have lamented over this predominancy of Arminianism, as a falling away from the spirit and principles of the symbolical standards of the English church; some, on the other hand, have stoutly maintained the original Arminianism of this church; while others assert that the claims of the two contending parties are based upon an unfair interpretation of certain particular doctrines. 'In the year 1618,' writes Waterland, 'our divines at the synod of Dort had commission to yield upon the doctrine of universal redemption, as the doctrine of the church of England (though they were outvoted in it), which one doctrine, pursued in its just consequences, is sufficient to overthrow the whole Calvinist system of the five points.' This assertion of Waterland is corroborated by the documents published by John Hales, who was present at Dort. But these opinions we shall consider in connection with the general history of theology, and conclude the present sketch with a quotation, the kindly spirit of which contrasts strangely with the prevalent bitterness of theologians during the first half of the seventeenth century, in which this author lived. 'Finding, upon this serious search, that all doubts are not clearly decided by Scripture; that the antient church, after the age of St. Augustin, which was presently contradicted by many Catholics (as you may see in the epistles of Prosper and Fulgentius to him upon this very occasion), they have ever been friendly debated, and never determined on in any council; that in our days whole churches are here divided, either from one another, as the Lutherans from us, or among themselves, as the Romanists, amongst whom the Dominican family is wholly for the Contra-Remonstrants; that in all these several churches, some particular doctors vary in these opinions; but of all this I collect for my part, that these points are not essential Catholic verities, not essential to the faith, merely matters of opinion, problematical, of inference and argument, wherein a man may err, or be ignorant, [illegible] danger to his soul. Yet so still, that the glory of God's justice, mercy, truth, sincerity, and divine grace be not any ways blemished, nor any good ascribed to man's corrupt will, nor any evil to God's decree of providence."*

PELA'GIUS I. succeeded Vigilius in the see of Rome A.D. 555. Like his predecessor, he was involved in ecclesiastical controversy with most of the Western bishops, concerning certain theological tenets condemned by the council of Constantinople, and known in controversial history by the name of the three chapters, being supported in his view of the question by the emperor Justinian, who was fond of interfering in theological disputations. (Noris, *Dissertatio de Synodo quintâ*.) Pelagius died in the year 560, and was succeeded by John III.

PELA'GIUS II. succeeded Benedict I., A.D. 578. He was likewise embroiled in disputes concerning the three chapters above mentioned. In the meantime a council which assembled at Constantinople bestowed on the patriarch of that city the title of *Œcumenic* or 'universal' bishop, at which Pelagius was greatly offended. He died at Rome, A.D. 590, and was succeeded by Gregory I.

PE'LAGUS, De Montfort's name for a genus of *Ammonites*, whose spire is covered by the last whorl, and which have no umbilicus; *Orbulites* of Lamarck and others.

PE'LAMYS, Daudin's name for a genus of marine ophidians [HYDRUS] found in the seas of warm climates. A specimen of *Pelamys bicolor* has been picked up dead on the beach of the west coast of New Zealand.

Dr. Cantor, in his *Observations on Marine Serpents*, enters into the distinguishing anatomical characters, habits, and general conformation of this group with reference to the element in which they exist. But little attention has hitherto been given to them, on account of the danger of examining them alive, and also from their geographical position being entirely confined to the tropical seas. Dr. Cantor was stationed on the delta of the Ganges, and had, for a considerable period, very favourable opportunities of studying these ophidians, many of which were taken in the nets of the fishermen. The principal physiological point of interest established by the Doctor is the highly venomous character of all the species without exception, a fact denied by Schlegel, who states them to be harmless, an erroneous idea which is also current among the natives. Dr. Cantor gives fatal proof of this error in the death of an officer in Her Majesty's service not long ago, within an hour or two after the bite of a serpent which had been caught at sea; and from numerous experiments conducted by himself, the result of which was that fowls, fish, and other animals invariably died within a few minutes after the bite had been inflicted. (*Zool. Proc.*, 1838.)

PELARGO'NIUM is the name given by botanists to the gaily painted flowers which are usually called Geraniums in our greenhouses. The latter differ obviously from Pelargonium in having regular flowers, and in being herbaceous plants, while the genus in question consists almost entirely of shrubs with flowers as irregular as those of the Pansy. There is a large number of genuine species of this genus, chiefly inhabiting the Cape of Good Hope; and as these intermix very readily, producing in great abundance shrubs which are capable of being perpetuated by cuttings, a prodigious number of spurious species, as well as acknowledged varieties, have found their way into the writings of systematic botanists. For example, De Candolle enumerates 389 supposed species, of which at least one half are of artificial origin. While however science has been embarrassed by this facility of crossbreeding, the gardens have been enriched by crowds of the most beautiful objects, in which the features of their savage progenitors can no longer be recognised; and it is probable that of all the flowers which have been acted upon by the hand of man, the Pelargonium is that in which the result has been most striking.

By care and attention to a few simple points of practice, these plants may be cultivated and multiplied by any one who has a greenhouse, and hence they have become universal favourites. These points are the following, namely: 1, water, 2, warmth, 3, a gentle bottom heat, 4, abundance of air, 5, as much light as the leaves will bear, and 6, a rich soil during the season of growth; and a cool atmosphere, less water, abundance of light, and close pruning afterwards.

PELASGI (Πελασγοί) were the most antient inhabitants of Greece, as far as the knowledge of the Greeks themselves extended. A dynasty of Pelasgic chiefs existed in Greece before any other dynasty is mentioned in Greek traditions. Danaus is in the ninth, Deucalion in the eighth, and Cadmus in the seventh generation before the Trojan war; but Phoroneus the Pelasgian is in the eighteenth generation before that epoch. The Greek traditions represent the Pelasgic race as spread most widely over almost all parts of Greece and the islands of the Grecian archipelago. The whole of Hellas, according to Herodotus (ii. 56), was originally called Pelasgia; and Æschylus (*Suppl.*, 250) introduces Pelasgus, king of Argos, as claiming for the people named after him all the country through which the Algos flows, and to the west of the Strymon. We find mention of the Pelasgi in the Peloponnesus, Thrace, Thesprotia, Attica, Bœotia, and Phocis. (Strabo, vii. 321; Herod., viii. 44.) The oracles of Delphi and Dodona were originally Pelasgic (Strabo, ix. 402; vii. 327; compare Herod., ii. 52); and Mr. Clinton (*Fast. Hell.*, vol. i., p. 98) and Niebuhr (*Rom. Hist.*, vol. i., p. 27) have adduced reasons for believing that the Macedonians also were a Pelasgic race. We also find traces of the Pelasgi in many of the islands of the Ægean Sea, as Lemnos, Imbros, Lesbos, Chios, &c. (Strabo, xiii. 621), and Herodotus informs us (vii. 95) that the islands were inhabited by the Pelasgic race till they were subdued by the Ionians. The neighbouring coast of Asia Minor was also inhabited in many parts by the Pelasgi. (Strabo, xiii. 621.) The country afterwards called Æolis was occupied by Pelasgians (Herod., vii. 95); and hence Antandros was called Pelasgic in the time of Herodotus (vii. 42). Tralles in Caria was a Pelasgic town (Niebuhr, *Rom. Hist.*, vol. i., p. 33), and two of their towns on the Hellespont were still extant in the time of Herodotus (i. 57).

The preceding authorities are sufficient to show the wide diffusion of the Pelasgic race; but it is a difficult matter to determine from what quarter they originally came. Many modern writers (Malden, *Hist. of Rome*, p. 69; Bishop Marsh, *Horæ Pelasgicæ*, c. i) conclude, from our knowledge of the original seats of the human race, that the Pelasgians spread themselves from Asia into Europe, across the Hellespont, and round the northern shores of the Ægean Sea. But this opinion, though it may be true, is opposed to many Greek traditions, which represent the Peloponnesus as the original seat of the Pelasgians, whence they spread to Thessaly, and thence to the islands of the Grecian archipelago and to the Asiatic coast.

Phoroneus, son of Inachus, king of Argos, is represented by most Greek traditions as the first king of the Pelasgi, and the early chronologers give a list of his successors at Argos. One of these kings, Pelasgus, who was in the ninth or tenth generation from Phoroneus, is said to have colonised Arcadia; but according to the Arcadian traditions, the Pelasgi originated in Arcadia. (Paus., viii. 1, § 2; Ephorus, *apud Strab.*, v. 221.) From the Argive Pelasgians the race spread to Asia and the other parts of Greece, but it is difficult to arrange the times of these early Pelasgic migrations. Clinton (*Fast. Hell.*, vol. i., p. 14) places them in the following order:—1, A migration under a Pelasgic chief, represented by Xanthus, son of Triopas, planted a colony first in Lycia and afterwards in Lesbos. (Diod., v. 81.) 2, Two generations later a migration proceeded to Thessaly, represented by Achæus, Phthius, and Pelasgus, sons of Larissa.* 3, Nearly contemporary with this migration, and in the ninth generation from Phoroneus, a Pelasgic chief, probably derived from Argos, established himself in Arcadia. 4, Two generations afterwards, the Œnotrians and Peucetians, Pelasgic tribes, described under the persons of Œnotrus and Peucetius, sons of Lycaon, migrated to Italy. (Dionys., *Antiq.*, i., p. [illegible].)

The Pelasgians were widely spread over the south of Italy; and the places in which they appear to have been settled are indicated by Mr. Malden (*Rom. Hist.*, p. 72-83) and Niebuhr (*Rom. Hist.*, vol. i., p. 22-63). There seems no reason for rejecting, as some modern writers have done, the account of Dionysius, that the Pelasgi emigrated from Greece to Italy.

In some parts of Greece the Pelasgians remained in possession of the country to the latest times. The Arcadians were always considered by the Greeks themselves as pure

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* Wordsworth's Ecc. Biog., v. [illegible]

* The name Larissa frequently occurs in Pelasgic localities. It was also a common name of the citadel or akropolis of the Pelasgians; thus we find that the citadel of Argos was called Larissa (Paus., ii. 24, § 1), and we also read of two Larissas in Thessaly, a Larissa near Troy, another near Cumæ, another in the territory of Ephesus, another near Tralles, on the borders of the plain of Cayster, as well as many others. ([illegible])

Pelasgians, and a Pelasgian dynasty reigned in Arcadia till the second Messenian war. (Herod., i. 146: ii. 171; viii. 73.) According to Herodotus (viii. 44; i. 57), the Athenians were a Pelasgic race, which had settled in Attica from the earliest times, and had undergone no change except by receiving a new name and adopting a new language. In most parts of Greece however the Pelasgic race became intermixed with the Hellenic, but the Pelasgi probably at all times formed the principal portion of the population of Greece. The Hellenes excelled the Pelasgi in military prowess and a spirit of enterprise, and were thus enabled in some cases to expel the Pelasgi from the country, though the Hellenes generally settled among the Pelasgi as a conquering people.

The connection between the Pelasgic and Hellenic races has been a subject of much controversy among modern writers. Many critics have maintained that they belonged to entirely different races, and some have been disposed to attribute to the Pelasgians an Etruscan or Phœnician origin. It is true that many of the Greek writers speak of the Pelasgians and their language as barbarous, that is, not Hellenic; and Herodotus (i. 57) informs us that the Pelasgian language was spoken in his time at Placia and Scylace on the Hellespont. This language he describes as barbarous; and on this fact he mainly grounds his general argument as to the antient Pelasgian tongue. It may however be remarked, that it appears exceedingly improbable, if the Pelasgic and Hellenic languages had none or a very slight relation to each other, that the two languages should have so readily amalgamated in all parts of Greece, and still more strange that the Athenians and Arcadians, who are admitted to have been of pure Pelasgic origin, should have lost their original language, and learned the pure Hellenic tongue. In addition to which it may be added, that we scarcely ever read of any nation entirely losing its own language and adopting that of its conquerors. Though the Persians have adopted many new words into their language from their Arab masters, yet twelve centuries of Arab domination have not been sufficient to change in any essential particular the grammatical forms and general structure of the antient Persian; and notwithstanding all the efforts that were used by our Norman conquerors to bring the French language into general use in this country, the Saxon remains to the present day the main element of our language. It is therefore reasonable to suppose that the Pelasgic and Hellenic tongues were different dialects of a common language, which formed by their union the Greek language of later times.

The antient writers differ as much respecting the degree of civilization which the Pelasgi attained before they became an Hellenic people, as they do respecting their original language. According to some antient writers they were little better than a race of savages till conquered and civilised by the Hellenes; but others represent them, and perhaps more correctly, as having attained a considerable degree of civilization previous to the Hellenic conquest. Many traditions represent the Pelasgians as cultivating agriculture and the useful arts; and a modern writer (Thirlwall's *Greece*, vol. i., p. 59) rather fancifully supposes that the most antient form of their name (Πελαργοί) signified inhabitants or cultivators of the plain. It is a curious fact, which has been noticed by Mr. Malden, in his 'History of Rome' (p. 70), that the Grecian race which made the most early and most rapid progress in civilization and intellectual attainments, was one in which the Pelasgian blood was least adulterated by foreign mixture—the Ionians of Attica and of the settlements in Asia; and that we probably owe to the Pelasgic element in the population of Greece all that distinguishes the Greeks in the history of the human mind. The Dorians, who were the most strictly Hellenic, long disdained to apply themselves to literature or the fine arts.

Some writers have maintained that the Greeks derived the art of writing and most of their religious rites from the Pelasgians; but without entering into these questions, it may be asserted with some degree of certainty that the most antient architectural monuments in Europe clearly appear to have been the works of their hands. The structures in Greece, Italy, and the western coast of Asia Minor, usually called Cyclopean, because, according to the Greek legends, the Cyclopes built the walls of Tiryns and Mycenæ, may properly be assigned to a Pelasgian origin. All these structures are characterised by the immense size of the stones with which they are built; the most extraordinary of all is the treasury or tomb of Atreus at Mycenæ, of w an account is given under MYCENÆ.

(Marsh's *Horæ Pelasgicæ*; Niebuhr's *Hist. of R* vol. i, p. 25-62; Malden's *Hist. of Rome*, p. 69-83; T wall's *Hist. of Greece*, vol. i., p. 32-62; Clinton's *Fasti H lenici*, vol. i., p. 1-30; Wachsmuth's *Hellenische Altert kunde*, vol. i., part i., s. 9; Curtius, *De Antiquis Italiæ I colis*, s. 6, 7; Kruse's *Hellas*, vol. i., p. 404, &c.)

PELASGIAN ARCHITECTURE. [PELASGI.]

PELA'YO, first king of Asturias, was the son of F duke of Cantabria, and a descendant of Chindaswind twenty-eighth in order among the Gothic kings of S After the disastrous battle of Guadalete (A.D. 711), all Christians who either feared the cruelties of the M conquerors or could not bear their yoke, fled for re the inaccessible mountains of the Asturias, where the of the invaders had not yet reached. Among them Pelayo, who, according to some authorities, had fou bravely on the plains of Xerez, and witnessed the de the Christian arms, but who, if we follow the accou the Arabian writers, escaped from Cordova, where he retained as a hostage for the fidelity of his countrymen. his arrival among the refugees, Pelayo was appointed chief. At first these relics of the Gothic monarchy only to have been animated by the wish of self-pr tion, but on their numbers increasing, they thought viving the expiring embers of liberty. Al-horr Ibn A rahman, who governed Spain in the khalif's name [M having been apprised of their intentions, despatched a siderable force under Alkama, to crush the rising in tion, but the followers of Pelayo had already gained p sion of the mountain pass of Auseva, near the river S and concealed part of their force in the cavern of C donga. While the Moslems were ascending the acclivity where the Christians were encamped, and wher chapel of St. Mary now stands, a sudden attack up of their flanks, accompanied by a shower of stones, and f ments of rocks hurled down from the top of the moun threw their ranks into confusion. Pelayo and his fo then issued from the cavern, and the Moslems fled cipitately from the field of battle, leaving their gener thousands of their men (A.D. 718).

Pelayo's success did not end here. Munuza, or A nayzir, the governor, some say, of Leon, others, of G who hastened to the assistance of his countrymen, l life in a like manner, and his army was completely de These memorable events fixed the destiny of the n kingdom. The important city of Leon, long the c Pelayo's successors, was next reduced (722), as well as Z mora, Lugo, and Astorga, and although the Mohamm in 724 recovered some of these places, the intestine wa which they themselves were engaged, and the repeated cursions of Pelayo, helped to consolidate the little king which the Asturian hero transmitted to his succe Alonso el Casto. The remainder of Pelayo's reign is known. He died in 737, and was buried in the chur Santa Eulalia at Cangas de Onis. Pelayo is entitled t grateful remembrance of posterity. At the head of a h ful of men he checked the torrent of Mohammedan inva and laid the foundations of a power which, after eig turies of unremitting and bloody warfare, accomplished final expulsion of the Mohammedan invader from peninsula.

(Mariana, *Historia General de España*, lib. vii., c Masdeu, *Historia Critica*, vol. xii.; Conde, *Historia Dominacion de los Arabes en España*, vol. i. p. 73; F bon, *Cartas para ilustrar la Historia de España*, M 1806.)

PELECA'NIDÆ, Dr. Leach's name for a fam *Natatores*, or Swimming Birds.

The genus *Pelecanus* of Linnæus, placed in the 'Sy Naturæ' between *Diomedea* and *Plotus*, contains the Pelicans (*Pelecanus Onocrotalus*), the Frigate B Man-of-War Bird (*Tachypetes*), under the designa *P. Aquilus*, the Cormorants (*Pelecani Carbo* and *Gr* and the Solan Goose and Boobies.

The *Totipalmes* of Cuvier (comprising those *Palm* which have the hind toe united with the others in a membrane, perch on trees, are good fliers, and have legs) consist of the *Pelicans* (*Pelecanus*, Linn., c hending all those which have the base of the bill of feathers. Their nostrils are slits, the aperture of w scarcely perceptible. The skin of the throat is more or less extensible, and their tongue very small. Their stomach or gizzard, if gizzard it may be called, forms one large sac with their other stomachs. Their eyes are only moderate or small. The following are the genera comprehended under the *Pelecanidæ*: the Pelicans properly so called (*Onocrotalus* of Brisson, *Pelecanus* of Illiger); the Cormorants (*Phalacrocorax* of Brisson, *Carbo* of Meyer, *Halieus* of Illiger); the Frigates (*Pelecanus Aquilus*, Linn., *Tachypetes*, Vieill.); the Boobies (*Sula* of Brisson, *Dysporus* of Illiger). The Pelicans are succeeded by the Anhingas (*Plotus*, Linn.), and the Tropic Bird (*Phaeton*, Linn.).

Mr. Vigors, in his 'Observations on the Natural Affinities that connect the Orders and Families of Birds' (*Linn. Trans.* vol. xiv.), observes that the *Pelecanidæ* are distinguished by a syndactyle foot, the hind toe being directed to the front, and all the toes being united in a membrane. The *Alcadæ* have no hind toe; but these two families are, in the opinion of Mr. Vigors, brought into contact by *Aptenodytes* (Penguins), which possesses a hind toe, small and feeble in construction, in which it approaches the preceding *Alcadæ*, while on the other hand, it has this member directed to the front, but without a connecting membrane, by which means the four toes are similarly placed with those of the *Pelecanidæ*, which, according to the system of Mr. Vigors, comprise the whole of the groups which formed the genera *Pelecanus*, *Phaeton*, and *Plotus* of Linnæus. 'The first of these genera,' continues Mr. Vigors, 'is divided into the following generic groups:—*Phalacrocorax*, Briss., which seems to retain the nearest affinity to the birds of the last family in habits and appearance; *Onocrotalus*, Briss., the genus so familiar to us as including the *Pelican of the Wilderness*; *Sula*, Briss., which contains our Gannet; and *Tachypetes* of M. Vieillot, the *Frigate bird* of our navigators. The manners of this last bird I have discussed somewhat at large at the commencement of this inquiry, as well as the various particulars by which it deviates from the type of the *Natatores*, in conjunction with the greater portion of the present family. I shall not therefore dwell upon the subject any further than to mention its intimate and acknowledged connection with the genus *Phaeton*, both in habits and general economy. In these particulars, as well as in the length of their wings and their extended powers of flight, these two groups evince a near alliance with the family of *Laridæ*, which succeeds, and from which they can only be separated in consequence of their syndactyle feet. The genus *Plotus*, united by its bill to *Phaeton*, leads back to the earlier groups of the *Pelecanidæ*, with which though it differs from them by the straightness of the bill, it agrees in manners and general appearance.'—and he goes on to observe that *Phaeton* bears a considerable resemblance in general appearance and habits to *Sterna* among the *Laridæ*, which family he next enters.

Mr. Swainson, who places the *Pelecanidæ* between the *Mergidæ* and the *Laridæ*, describes the Pelicans as flying with ease and even with swiftness, and as a large, voracious, and wandering tribe, living for the most part at the ocean, and seldom approaching land but at the season of incubation. Their bill is long, and armed at the end with an abrupt hook, the width of the gape excessive; the face generally bare of feathers, and the skin of the throat sometimes so extensible as to hang down like a bag; by this singular organisation, observes Mr. Swainson, the pelicans are able to swallow fish of a very large size, and the whole family may be termed marine vultures. In this part of the work (*Classification of Birds*) the genera comprised under the *Pelecaninæ* are, *Pelecanus*, *Carbo*, *Dysporus*, *Phaeton*, and *Plotus*. In the 'Synopsis' *Phaeton* is arranged as a subgenus of Terns (*Sterna*), in the family *Laridæ*. [Tropic Bird.]

Mr. George Robert Gray, of the British Museum, in his 'List of the Genera of Birds, with an Indication of the Typical Species of each Genus' (London, 1840*), makes the *Pelecanidæ* the sixth and last family of the *Natatores*, and separates it into the subfamilies *Plotinæ*, *Phaetoninæ*, and *Pelecaninæ*. The last subfamily consists of the genera *Sula*, *Onocrotalus*, *Pelecanus*, *Phalacrocorax*, and *Graculus*.

Pelecanus. (Linn.)

Generic Character.—Bill long, straight, wide, very much depressed; upper mandible flattened, terminated by a very strong hook or nail, which is compressed and very much bent; lower mandible formed by two osseous branches, which are depressed, flexible, and united at the point, and from which a naked skin in the form of a bag is suspended. Face and throat naked. *Nostrils* basal, in the shape of longitudinal slits. *Feet* strong and short; three anterior toes; the hind toe is articulated anteriorly, but on the same plane with the others, and all are united by a membrane; middle claw without dentilations. *Wings* moderate; first quill shorter than the second, which is the longest; greater wing-coverts and secondaries nearest to the body as long as the quills. (*Temm.*)

Head of Pelican.

Foot of Pelican.

The true Pelicans are large and heavy birds, with a great extent of wing, and are excellent swimmers. The expansive pouch, whose elasticity is well known to all who have witnessed the shapes into which it is stretched and formed by the itinerant showman, will hold a considerable number of fish, and thus enables the bird to dispose of the superfluous quantity which may be taken during fishing expeditions, either for its own consumption or for the nourishment of its young. In feeding the nestlings,—and the male is said to supply the wants of the female when sitting in the same manner,—the under mandible is pressed against the neck and breast, to assist the bird in disgorging the contents of the capacious pouch; and during this action the red nail of the upper mandible would appear to come in contact with the breast, thus laying the foundation, in all probability, for the fable that the Pelican nourishes her young with her blood, and for the attitude in which the imagination of painters has placed the bird in books of emblems, &c., with the blood spirting from the wounds made by the terminating nail of the upper mandible into the gaping mouths of her offspring.*

The neighbourhood of rivers, lakes, and the sea-coasts are the haunts of the Pelicans, and they are rarely seen farther than twenty leagues from the land. They appear to be, to a certain extent, gregarious. Le Vaillant, upon visiting Dassen Eyland, where was the tomb of a Danish captain, at the entrance of Saldanha Bay, beheld, as he says, after wading through the surf and clambering up the rocks, such a spectacle as never perhaps appeared to the eye of mortal. 'All of a sudden there arose from the whole surface of the island an impenetrable cloud, which formed, at the distance of forty feet above our heads, an immense canopy, or rather a sky, composed of birds of every species, and of all colours:—cormorants, sea-gulls, sea-swallows, pelicans, and, I believe, the whole winged tribe of this part of Africa, were here assembled. All their voices, mixed together and modified according to their different kinds, formed such a horrid music that I was every moment obliged to cover my head to give a little relief to my ears. The alarm which we spread was so much the more general among these innumerable legions of birds, as we principally disturbed the females which were then sitting. They had nests, eggs, and young to defend. They were like furious harpies let loose against us, and their cries rendered us almost deaf. They often flew so near us that they flapped their wings in our faces; and though we fired our pieces repeatedly, we were not able to frighten them; it seemed almost impossible to disperse this cloud. We could not move one step without crushing either their eggs or their young ones; the earth was entirely strewed with them.' The same traveller found on the Klein-Brak river, whilst waiting for the ebb tide, thousands of pelicans and flamingoes, the deep rose-colour of the one strongly contrasting with the white of the other.

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* A second edition appeared.

* [illegible]

Geographical Distribution.—The species are widely spread (Europe, Asia, Africa, and America), though not numerous: two are Europeans, *Pelecanus Onocrotalus*, and *Pelecanus crispus*. We select the former as an example.

Description. (*Old.*)—The plumage generally of a fine white tinted with light rose or salmon colour, which is brightest in the breeding season, except the primaries and spurious wing, which are black, and the depending occipital crest and a few pendulous feathers on the lower part of the neck, which are light yellow; naked space round the eyes and at the base of the bill, where the frontal feathers form a point, flesh-colour; the upper mandible bluish, with a crimson line running along the top, reddish at the base, yellowish at the tip, and the terminal nail red; guttural pouch yellow; irides bright reddish brown or hazel; feet livid; tail short. Length from five to six feet; expanse of wings twelve or thirteen feet. Sexes similar.

Young of the year, and those of a year old.—Whitish ash throughout; belly whitish; wings and back very deep ash; all the feathers bordered with brighter ash; quills blackish ash; bill and naked parts livid; iris brown. The first white feathers appear on the neck and belly. (Temm.) Mr. Gould (*Birds of Europe*) says that the bird is remarkable for longevity, and for the long period requisite for the completion of its plumage. The first year's dress he describes as wholly brown, the feathers of the back and breast being broad and rounded. The lanceolate feathers and the rosy tints are only acquired as the bird advances in age, and Mr. Gould thinks, judging from individuals in partial confinement, that five years are required before the bird becomes fully mature.

Food, Habits, Reproduction, &c.—Fish is the food of the Pelican, which it captures with great adroitness, generally in shallow inlets. It is no diver, but it will occasionally dash from a great height on the wing upon a fish with such velocity that it becomes submerged, though its buoyancy brings it instantly to the surface again. Although it perches on trees, it seems to prefer rocky shores. The nest, generally formed of coarse reedy grass, with a lining of grass of a softer quality, is large (about a foot and a half in diameter), and made upon the ground. Two, three, four, and sometimes five pure white eggs, but mostly two, of nearly the same size at both ends, are laid in it.

Sonnerat found five under a female of this genus. She would not rise to let him pass, but kept her seat. She struck at him with her bill, and screamed when he attempted to drive her from her eggs. Labat fastened two young pelicans to a stake. The mother daily brought them food, and remained with her young ones constantly until the evening, when she flew up to roost in a tree immediately above them. The trio became very familiar, suffering Labat to touch them; and the young ones gratefully accepted the little fish which he offered to them, and which they first put into their pouches. These Pelicans were, in all probability, not of the species under consideration.

Localities.—The Oriental countries of Europe; common on the rivers and lakes of Hungary and Russia; tolerably abundant on the Danube; rare and accidental on the sea-coast. An adult specimen, sent to M. Temminck, who the above habitats, from Egypt, and another from the Cape of Good Hope, differed in nothing from those of Europe, except in their greater dimensions. That the species exists in Asia there is no doubt. Belon, who refers to *Leviticus* (xi. 18), where the bird is noted as unclean, says that it is frequent on the lakes of Egypt and Judæa. When he was passing the plain of Roma, which is only half a day's journey from Jerusalem, he saw them flying in pairs like swans above his head, rather low; and adds that they are seen flying in a large flock like those birds. Hasselquist saw it at Damietta in Egypt. He also adds that it comes to Egypt in the middle of September, in his chapter on the arrival there of migrating birds. 'In flying,' says Hasselquist, 'they form an acute angle, like the common wild geese when they migrate. In the summer they inhabit the Black Sea and coasts of Greece; and in their migration remain for a few days near Smyrna and other parts of the coasts of Natolia, but never stray far from the continent: they fly very high. Some of them remain at Damietta, and in the islands of the delta in the Mediterranean, but the greater part go to Egypt.' They appear in some of the Egyptian drawings. (Rossellini.)

Dr. Von Siebold and M. Bürger saw it in Japan, and their observation is confirmed by M. Temminck. Mr Gould states that though the tropical climates of Africa and India constitute its natural habitat, nevertheless the eastern rivers of Europe, such as the Danube and Volga, the extensive lakes of Hungary and Russia, and the shores of the Mediterranean, are places where it dwells in abundance. The same author says that it is a species strictly confined to the Old World, over a great part of which it is distributed. The Prince of Musignano, in *Specchio Comparativo*, quotes it as being rare and adventitious at Philadelphia and Rome. Dr. Richardson quotes it, or rather a variety of it, killed on the Missinippi, 56° N. lat. 'Pelicans,' says the Doctor, 'are numerous in the interior of the fur countries up to the sixty-first parallel; but they seldom come within two hundred miles of Hudson's Bay. They deposit their eggs usually on small rocky islands, on the brink of cascades, where they can scarcely be approached; but they are otherwise by no means shy birds. They fly low and heavily, usually in flocks from six to fourteen, sometimes abreast, at other times in an oblique line; and they often pass close over a building or within a few yards of a party of men without exhibiting any signs of fear. They haunt eddies under waterfalls, and devour great quantities of carp and other fish. When gorged with food, they doze on the water, and may be easily captured, as they have great difficulty in taking wing at such times, particularly if their pouches be loaded with fish. Though they can perch on trees, they are most generally seen either on the wing or swimming. Some specimens, apparently in mature plumage, have the bill quite smooth above; but individuals have a long thin bony process, about two inches high, springing from the ridge of the upper mandible. Similar processes existed in the specimens commented upon by Pennant and Forster, which were brought from Hudson's Bay: but no such appearances have been described as occurring on the bills of the White

Pelecanus Onocrotalus.

Pelicans of the Old Continent.' The Prince above quoted, in his later *Geographical and Comparative List*, erases *Pel. Onocrotalus* from the column of American birds, supplying its place by *Pelecanus Trachyrhynchus*, Lath. (*Pel. erythrorhynchos*, Gm., *Pel. Americanus*, Aud.), and this probably is the species alluded to by Dr. Richardson: indeed there can be little or no doubt of it.

The following notes, by Professor Owen, throw much light on the organization of birds of this group as applicable to their habits.

The Pelican which he dissected—*Red-backed Pelican* of Latham, *Pelecanus rufescens*, Gmel., a female—measured three feet seven inches from the extremity of the beak to the anus, and ten inches and a half from the extremity of the upper mandible to the nostrils. 'These,' says the Professor, 'are almost concealed slits in the lateral grooves of the upper mandible, just anterior to the skin of the head. They will barely admit the flat end of a probe; and lead almost vertically to the internal apertures of the nasal cavity. The air-cells in the *Pelican*, as in the nearly allied bird the *Gannet*, *Sula Bassana*, Temm., are remarkably extended and diffused over the body: the whole cellular tissue, even to the tips of the wings and the end of the fleshy part of the legs, can be blown up from the *trachea*.

'The extent to which the skeleton of the *Pelican* is permeated by air has been particularly noted by Mr. Hunter in his celebrated paper 'On the Air-cells of Birds,' in which he throws out a suggestion that it may assist the birds of this species in carrying heavy loads in their large *fauces*. This supposed relation of extended air-cells to a largely developed beak is borne out in the case of the *Hornbill*, in which every bone of the skeleton is permeated by air, but is apparently contradicted by the *Gannet*; I say apparently, because although the *rami* of the lower jaw do not, in this species, afford suspension to a capacious reservoir, as in the *Pelican*, yet the bird may occasionally have to bear away a considerable load, as, for instance, in a large fish seized by its mandibles, and a previous accumulation in its dilatable *œsophagus*.

'Mr. Hunter, it may be remembered, was doubtful, on the first publication of his paper, as to the source from which the mandibles derived their gaseous contents; not that he was ignorant of the air-holes in the bones, as he is careful to tell us in the reprint of the Memoir, in the "Animal Œconomy," where he states that the lower jaw of the "*Pelican* is furnished with air, which is supplied by means of the Eustachian tube."

'To ascertain the correctness of this description, I sawed across the left *ramus* of the lower jaw; but on blowing into the end of the part attached to the head, I found that the air did not escape, as I had expected, by the Eustachian tube (the orifice of which is a slit, situated on the roof of the mouth, one inch behind the posterior or internal *nares*), but filled, first the air-cells under the throat, and then, passing down the neck, raised the large air-cell above the *furculum*. On dissection, I found that the air passed into the lower mandible immediately from an air-cell surrounding the articulation between the jaw and *os quadratum*, which received its air from the lungs by means of the cells passing along the neck and throat, &c. The authority of Mr. Hunter ought not to be set aside by the result of a single experiment; and the possibility of accidental rupture may be urged against the above observation; but it is at all events worthy of being recorded, and should be repeated when opportunity occurs, with the addition of blowing into the Eustachian tube, which I omitted to do.

'There is little to be added to the accounts already given in the works of Cuvier, and of Professor Tiedemann and Carus, of the digestive organs of the *Pelican*. The weak or thin-coated stomach, small cæca, and short intestines bespeak its animal diet; and the uniformly capacious œsophagus, as well as the suspended faucial bag, may be regarded as pointing to the piscivorous habits of this singular species. It is more difficult to assign the use of the globular cavity interposed between the gizzard and the *duodenum*, which the *Pelican* has in common with some of the piscivorous *Grallæ*, viz. those of the genus *Ardea*. In them the pyloric cavity is very small, but in the *Pelican* it is fully as large in proportion as in the *Crocodiles*, which alone possess it among *Reptiles*. In the *Pelican* here described the pyloric cavity measured one inch and a half in diameter, communicated by a small transverse aperture with the gizzard, and by an opposite one, of smaller size and obliquely placed, with the *duodenum*. Its lining membrane is villous and vascular, and was in this instance tinged with bile, which must have entered by regurgitation, as none of the biliary ducts enter here.

'The *œsophagus* is continued into the *proventriculus* without any marked constriction, and the latter passes insensibly into the part analogous to the gizzard, which is comparatively of small size. The gastric glands are simple elongated follicles, closely compacted together, and extended over nearly the whole *proventriculus*.

'The *duodenum*, after making the usual fold, ascends on the right of the stomach; the intestine is then disposed in three or four coils upon a central mesentery, and then is strung on the edge of the mesentery in long and deep folds, from the last of which the *ileum* passes upwards behind the stomach, and then descends to join the *rectum*. At the point of junction were placed the *cæca*, each one inch and a half in length. The *rectum* is very short, and opens obliquely into a large urinary receptacle, as large, proportionately, as in the *Ostrich*. Before commencing the dissection, a quantity of very fluid urine, of a whitish colour, and containing whitish flakes, escaped on pressure being made upon the sides of the *cloaca*.

'The *liver* is bilobed, the right lobe much larger than the left, in which the edges were rounded off. There is a gall-bladder, which contained bile of a yellow colour, not green as in birds generally. The cystic, biliary, and hepatic ducts terminated in the end of the *duodenum*, close to which opened the duct of the *pancreas*. The latter gland was of a less elongated form than usual, being of a rounded figure, and not descending far into the fold of the *duodenum*. The spleen was placed behind the stomach, in length one inch, in breadth half an inch.

'The kidneys were of large size, being four inches long, two deep, and one and a half wide, which is very unusual in birds; the right kidney was half an inch higher than the left. Many of the small superficial branches of the ramified ureter which characterises the kidneys of the oviparous animals, were beautifully conspicuous from their white opake contents. The supra-renal glands were of a light yellow colour, and of a rough or granular pulpy texture; the right adhered closely to the *vena cava*, the left as closely to the ovary, which seemed to be developed partly from the gland and partly from the coats of the left femoral vein. The largest ova were nearly of the size of peppercorns, and about twenty in number: there were innumerable smaller ones. The oviduct was narrow at its commencement, but gradually attained a diameter of about four lines; it passed along the anterior part of the left kidney, adhering thereto by its peritoneal ligament.

'As the *Pelican* belongs to the group of *Natatores*, the *Totipalmes* of Cuvier, which contains species approximating most closely to the *Raptorial Birds*, and which are almost the only birds of this order, as Cuvier observes (*Règne An.*, nouv. éd., i., p. 361), that perch, I did not fail to try the common experiment suggested by Borelli's observations on the effect which bending the leg and ancle-joints might have upon the toes; the latter however exhibited no corresponding inflection. In perfect agreement with this is the observation that the *Pelicans* do not perch when they go to rest.' (*Zool. Proc.*, 1835.)

The dissection of a male of the same species, by Mr. Martin, is given in the same volume.

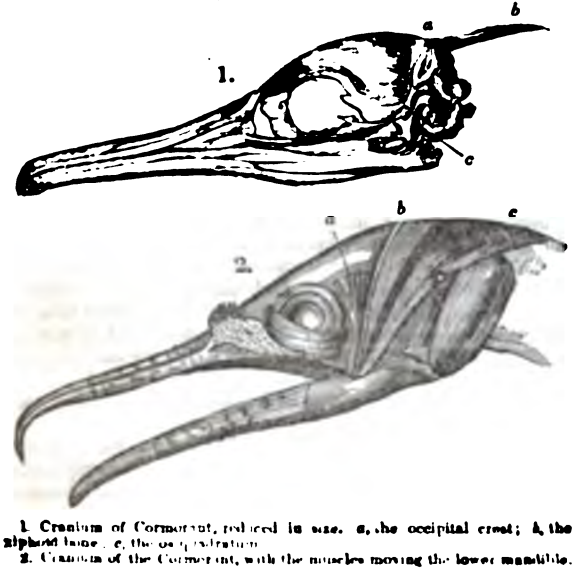
Phalacrocorax. (Briss.)

Generic Character.—*Bill* moderate or long, straight, compressed; upper mandible very much curved towards the point, and hooked; lower mandible compressed; base inserted in a small membrane, which extends under the throat. Sides of the face and throat naked. *Nostrils* basal, linear, hidden. *Feet* strong, short; three toes before, the hind-toe articulated interiorly, all united by a membrane; nail of the middle toe serrated. *Wings* moderate, the first *quill* longer than the second, which is longest.

This is the genus *Halieus* of Illiger, *Carbo* of Meyer, and *Hydrocorax* of Vieillot.

Mr. Yarrell, who observes (*Zool. Journ.*, vol. iv.) that most of those authors who have written on the comparative anatomy of birds agree in describing an additional bone as peculiar to the back part of the head of the Cormorant, or *Corvorant*, as he writes it (*Pelecanus Carbo*), adds that the muscles attached to this bone, and the services they are destined to render the animal, have been either overlooked or misconceived. He describes the additional bone as about one inch in length, triangular in shape, somewhat grooved on its surfaces, and, from its articulation with the occiput, tapering gradually to a point. The mode by which this bone is articulated to the occiput is considered by Mr. Yarrell to be similar to that observed in the ribs of serpents, in which the condyle is situated upon each vertebra, and the cavity is at the end of the rib: so in the Cormorant, the condyle is upon the occipital bone, the cavity at the triangular end of the xiphoid bone; the joint is therefore hemispherical, admitting great extent of motion. Mr. Yarrell then notices the great length of the os quadratum (*c*) from above downwards, in this and other birds which feed on fishes. The articulation of this bone, he observes, both with the cranium itself, as well as with the lower mandible, admits great latitude of motion. It moves with facility backwards, forwards, outwards, and inwards, by the action of the numerous muscles attached to it, thus increasing the capacity of the pharynx for the more easy passage of any unusually large fish. The rami of the lower mandibles are comparatively slender, weak, and elastic, and hence the value of the additional pair of muscles described by Mr. Yarrell, muscles which are not, he states, possessed by any of the species of *Colymbus*, *Alca*, *Uria*, and *Larus*, all of which have the rami of the lower mandibles much deeper and thicker in proportion.

The xiphoid or sword-shaped bone is described by Mr. Yarrell as having three surfaces, each slightly concave, forming together an isosceles triangle, the base of which is downwards. 'From the upper edge of this bone,' says Mr. Yarrell, 'to its lateral angle, throughout its whole length, from the extreme point to the occiput, there arises on each side a triangular-shaped long muscle, the fibres of which are directed forwards, downwards, and outwards, to be inserted by a strong tendon upon the upper edge of the lower mandible, immediately behind the insertion of the tendon of the temporal muscle. The muscles of the upper part of the neck, giving motion to the head, are inserted upon the occipital bone and its elevated crest, over which these additional muscles slide with every movement of the head, the particular articulation of the xiphoid bone only permitting it to become a fixed point of support to its own particular muscles, when both act simultaneously as additional elevators of the lower mandible, thus assisting in prehension, and materially increasing the power of the bird in securing a slippery prey. I may here also observe that the various other species of fish-feeding birds before referred to as having their lower mandibles so much stouter and stronger than the corvorant, have also much deeper *fossæ* and more elevated ridges for the origin and attachment of their temporal muscles, and are in this way better able to prevent the escape of their natural food, without the additional muscles of the corvorant. From these comparative remarks, it will be perceived that the corvorant does not possess the same strength of bone in the mandibles with the other oceanic fish-feeders, though not less inclined than they are to pursue and take fish of large size. The dilatation of which the lower mandible is capable from its elasticity, the length and freedom of motion of the ossa quadrata, the great size of the œsophagus, which, when distended, measures ten inches in circumference, all afford facilities for the swallowing of prey, which, but for his additional muscles, he would probably be unable to hold. This peculiarity of structure is most likely to be found in other species of the genus *Pelecanus*, but it is only in our common Corvorant that I have had opportunities of ascertaining the fact.'



1. Cranium of Cormorant, reduced in size. *a*, the occipital crest; *b*, the xiphoid bone; *c*, the os quadratum.
2. Cranium of the Cormorant, with the muscles moving the lower mandible. *a* and *b*, muscles answering to the masseter and temporal; *c*, the muscle arising from the xiphoid bone. (Yarrell.)

The xiphoid bone exists in the other European species of *Phalacrocorax*, and probably in the whole of that genus, but it is absent in the true Pelicans, and, we believe, in the *Frigate Bird* and *Plotus*. The recorded species are not numerous; five are noted as European. (Gould; Prince of Musignano.) We select two of these as examples.

Phalacrocorax Carbo. (*Old.*)—Under the throat a large white or whitish collar, the upper extremities of which reach to just below the eyes. Summit of the head, neck, breast, all the lower parts and the rump, lustrous greenish black; on the neck small whitish traits, which are nearly imperceptible; feathers of the upper part of the back and wings ashy-brown, or bronzed in the middle, bordered by a broad band of glossy greenish-black; quills and tail feathers black; bill blackish ash; naked region of the eyes greenish-yellow; small guttural pouch yellowish; iris green; feet black. Length 27 to 29 inches (*Both sexes—Winter Plumage*—Temm.).

M. Temminck remarks that individuals in this state of plumage have been most frequently described as females of the species.

Spring or *Nuptial Plumage.*—On the occiput and a part of the nape are long feathers, which form a crest of deep lustrous green; the large collar on the throat is pure white; on the summit of the head, on a great part of the neck, and on the thighs, appear very long, loose, and silky feathers of a pure white. These plumes are more or less long, according to the age of the individual. Rest of the plumage as in winter. (Temm.)

M. Temminck observes that the loose or decomposed plumes, as well as the long occipital feathers, appear in the spring in the interstices of the other feathers of the body, which the second moult does not effect: both sexes are ornamented with the loose plumes, and these accessory feathers fall the first, even before the time of the autumnal moult, so that these Cormorants are never found in this livery except at the season of love and during that of incubation. M. Temminck observes that Cuvier does not appear to have paid attention to this note, inasmuch as he has indicated the crest and the white on the neck as characteristic of the males.

Young of the Year.—Summit of the head, nape, and back, deep brown, with slight green reflections; the large collar whitish-grey; front of the neck and all the lower parts grey-brown, varied with whitish, particularly on the breast and the middle of the belly, where these spots are numerous; feathers of the upper part of the back, scapulars, and coverts of the wings, grey-ash in the middle, bordered by a band of deep brown; bill bright brown; iris brown. It is not till the age of one year that the young assume the perfect winter livery.

M. Temminck, in the 4th part of his *Manuel* [illegible] notices a variety which haunts maritime coasts, observed by MM. Hardy and Cantraine. The bill is larger, being from 12 to 13 lines in thickness, and the total length of the bird reaches 35 inches: the young have more white on the lower parts. The first of these naturalists observed these birds on the coasts of France, and the other on those of the islands of the Mediterranean Sea. This slight difference of stature may be attributed, as M. Hardy thinks (and M. Temminck concurs with him), to the abundance and quality of their food, sea-fish containing more substantial nourishment than river-fish, of which the species [illegible] makes prey.

The Cormorants on the south coasts of England are very large. Pennant relates that he weighed a bird of the species that exceeded seven pounds; the length was three feet four inches; the extent four feet two.

There is little or no doubt that this is the κόραξ [illegible] of Aristotle (*Hist. Anim.*, viii. 3), whose description of the bird and of its habits agrees well with that now [illegible]. It is the *Corvo Marino*, *Corvo Aquatico*, *Marang*[illegible] *rangone*, and *Mergone* of the Italians; *Cormorans* (Le[illegible] and *Cromorant* of the French; *Scharbe* and *See-Rabe* of the Germans; *Skarv* and *Aalekrage* of the Norwegians; *Aalekrage* of the Danes; *Skarfur* of the Icelanders; *Morfran* and *Morvran* of the ancient British; *Corvorant* and *Cormorant* of the modern British. It is the *Corvus Aquaticus* of Gesner, Ray, and others; *Pelecanus Carbo* of Linnæus; *Phalacrocorax Carbo* of Cuvier and others; and *Carbo Cormoranus* of Meyer and others.

It has been a question how the English name of the bird should be spelled, some preferring the form *Corvorant*, which is the form used by Montagu, Latham, Pennant, and Dr. Evans, the last of whom derives the word from *Corvus vorans*. *Cormorant* is considered a corruption by those who adopt this derivation. Milton, Ray, and Willughby write *Cormorant*, which is the form now generally used by British ornithologists.

Geographical Distribution very extensive. The species is an inhabitant of the New as well as the Old Continent. In the latter it is widely diffused. It is spread over a considerable portion of Europe, especially the north. Temminck notices it as very abundant in Holland in all seasons, as common in England and France, but rare in Germany and the south. It appears in the 'Geographical List' of the Birds of Musignano as an inhabitant of Europe generally and of America. In the 'Specchio Comparativo' it is noted as not very rare in winter at Rome, but rare in winter at Philadelphia. In the lately published part (4th) of his 'Manuel,' M. Temminck notes it as common in Sardinia, adding, that though the Japanese species differs but very little from that of our climates, it is nevertheless distinct; but he states that he has received a specimen from India resembling our species in every respect. It is, he says, common in some parts of the Ganges, but is not seen in the islands of Sunda.

Habits, Food, Reproduction, &c.—The Cormorant swims very low in the water; even in the sea the body is deeply immersed, little more than the neck and head being visible above the surface. It is a most expert diver, pursuing the fish which form its food with great activity under water. It is said to be very fond of eels. It flies with the neck outstretched, and may be often seen drying its drenched plumage on the shore or on insulated rocks. It perches on trees, where it is occasionally known to build its nest, but it usually selects rocky shores and islands, selecting, according to Selby, the summits, and not (like the Green Cormorant) the clefts or ledges. The author last quoted states that upon the Fern Islands its nest is composed entirely of a mass of sea-weed, frequently heaped up to the height of two feet, in which are deposited from three to five eggs of a pale bluish-white, with a rough surface. 'The young,' continues Mr. Selby, 'when first hatched, are quite naked and very ugly, the skin being of a purplish-black; this in six or seven days becomes clothed with a thick black down, but the feathered plumage is not perfected in less than five or six weeks. . . . I have repeatedly found that, upon being thrown into the sea, even when scarcely half fledged, they immediately plunge beneath the surface, and endeavour to escape by diving. This they will do to a great distance, using their imperfect wings, and pursuing their submarine flight in the same manner and almost with as much effect as their parents.'

The old French quatrain in the 'Portraits d'Oyseaux' gives no bad account of the habits of this bird:—

'Le Cormorant est oyseau fort commun,
Il [illegible]
[illegible]
[illegible]'

Its voracity is indeed great, and the way in which it will dispose of a large fish, a plaice for instance, aided in a great measure by the powers of compression and dilatation exercised on it by the apparatus noticed above, is surprising. The species is easily domesticated. Montagu, who kept one, gives a favourable account of its disposition, and indeed their docility is shown by the use made of them formerly in fishing. Willughby, quoting Faber, says: "They are wont in England to train up Cormorants to fishing. When they carry them out of the room where they are kept to the fish-ponds, they hoodwink them, that they be not frightened by the way. When they are come to the rivers, they take off their hoods, and having tied a leather thong round the lower part of their necks, that they may not swallow down the fish they catch, they throw them into the river. They presently dive under water, and there for a long time, with wonderful swiftness, pursue the fish, and when they have caught them, they arise presently to the top of the water, and pressing the fish lightly with their bills, they swallow them, till each bird hath after this manner devoured five or six fishes. Then their keepers call them to the fist, to which they readily fly, and little by little, one after another, vomit up all their fish a little bruised with the nip they gave them with their bills. When they have done fishing, setting the birds on some high place, they loose the string from their necks, leaving the passage to the stomach free and open, and for their reward they throw them part of the prey they have caught, to each perchance one or two fishes, which they by the way, as they are falling in the air, will catch most dexterously in their mouths. The kind of fishing with cormorants is, it seems, also used in the kingdom of China, as Nieremberg out of Mendoza relates.' Pennant cites Whitelock, who says that he had a cast of them manned like hawks, and which would come to hand. 'He took much pleasure in them, and relates that the best he had was one presented him by Mr. Wood, master of the corvorants to Charles I.' It is well known, adds Pennant, that the Chinese make great use of a congenerous sort in fishing, and that not for amusement but profit.

Sir George Staunton (*Embassy to China*) states that the embassy, in its journey to Han-chou-fou, 'had not proceeded far on the southern branch of the canal, when they arrived in the vicinity of the place where the *Leu-tze*, or famed fishing-bird of China (*Phalacrocorax Sinensis*), is bred, and instructed in the art and practice of supplying his owner with fish in great abundance. It is a species of the pelican, resembling the common corvorant, but which, on a specimen being submitted to Dr. Shaw, he has distinguished in the following terms:—"Brown pelican or corvorant with white throat, the body whitish beneath and spotted with brown; the tail rounded; the irides blue; the bill yellow." The bird, an undoubted cormorant, is figured in the Atlas, pl. 37, and a vignette at the end of the chapter shows two Chinese fishermen carrying their light boat, around the gunnel of which their cormorants are perched, by a pole, resting on their shoulders, between them. Sir George further says: "On a large lake close to this part of the canal, and to the eastward of it, are thousands of small boats and rafts, built entirely for this species of fishery. On each boat or raft are ten or a dozen birds, which, at a signal from the owner, plunge into the water; and it is astonishing to see the enormous size of fish with which they return grasped between their bills. They appeared to be so well trained that it did not require either ring or cord about their throats to prevent them from swallowing any portion of their prey, except what the master was pleased to return to them for encouragement and food. The boat used by these fishermen is of a remarkably light make, and is often carried to the lake, together with the fishing birds, by the men who are there to be supported by it."'

Phalacrocorax Carbo. Adult male in spring plumage. (Gould.)

Belon gives an amusing account, in his quaint French, of the chase of this bird during calms, especially in the neighbourhood of Venice, the hunt being carried on in very light boats, 'deux ou trois douzaines de compagnie,' each of which, says he, being rowed by five or six men, darts along the sea like the bolt from an 'arbalaste,' till the poor cormorant, who is shot at with bows as soon as he puts his head above water, and cannot take flight, after diving to suffocation, is taken quite tired out by his pursuers.

Phalacrocorax Cristatus (*Old, in Winter dress*).—The whole plumage of the most beautiful resplendent and lustrous green; upper part of the back, scapulars, and wing and tail coverts of a fine bronze; each feather framed as it were by a narrow band of beautiful velvety black; extremity of the wings not reaching beyond the origin of the tail, which is short, rounded, and of a dead black; base of the bill and very small guttural pouch fine yellow; bill brown; feet black; iris green. Length 2 feet 1 or 2 inches.

Old, in the Spring or Nuptial Plumage.—At the commencement of the spring there rises on the middle of the head, between the eyes, a fine tuft of wide and outspread feathers, about an inch and a half high, capable of erection, and which, in that state, present a *toupet*, or large plume; on the occiput also are ten or twelve rather long and subulate feathers. There are never any white feathers on the neck nor on the thighs, as in the Great Cormorant (last-mentioned species).

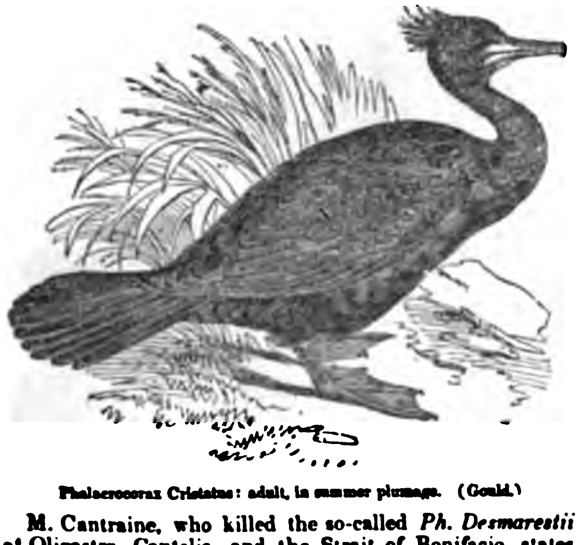
The *Young of the Year* are distinguished from the young of all the other species by their long and slender bill, their short tail, and the wide lustrous borders which surround all the feathers of the mantle. The colour of the upper parts is brown lightly shot with greenish; that of the lower parts is ashy-brown more or less whitish.

The bill of this species is very slender, two inches four lines long, and longer than the head. Tail very short, composed of 12 feathers. (Temm.)

This is the *Cormoran Largup* of Temminck; *Crested Corvorant* of Pennant; Shag or Green Cormorant of Gould.

M. Temminck, in the fourth part of his *Manuel*, states that *Carbo Desmarestii*, Peyrodeau (*Phalacrocorax Desmarestii*, Gould), one of the five European species noticed by Gould (*Birds of Europe*) and the Prince of Musignano (*Geographical List*), which had hitherto appeared to M. Temminck to be a distinct species from the *Cristatus* of the northern seas, is absolutely identical with it. This last opinion is founded on the careful comparison of a number of the so-called *Phalacrocorax Desmarestii* from the south, both adults and in intermediate stages, with individuals from Iceland, the Feroe Islands, the Orcades, and the maritime coasts of the North Sea. M. Temminck remarks that it has been observed that the *Ph. Desmarestii* has the bill longer, but in a great number of *Largups* from Iceland and the Feroe Islands only two were found with the bill of exact length and slenderness.

Habits, Food, Reproduction, &c.—The habits of *Ph. cristatus* are very similar to those of *Ph. Carbo.* The nest is placed in clefts and on ledges of clifts. Mr. Selby found that it was composed of a mass of sea-weed, chiefly *Fucus vesiculosus*, and that the eggs, four or five in number, were smaller than those of *Ph. Carbo*, but similar to them in outward appearance.



Phalacrocorax Cristatus: adult, in summer plumage. (Gould.)

M. Cantraine, who killed the so-called *Ph. Desmarestii* at Oligastra, Cantelia, and the Strait of Bonifacio, states that their principal food consists of the *Sparus Boops*, and that they always keep on rocks near the edge of the water in parties of not more than four; *Ph. Carbo*, which lives in the same localities, perches higher on the rocks.

Localities.—The whole of the north of Europe; very common in Iceland, the Orkneys, Feroe Islands, Norway, and Sweden, in the vicinity of great lakes. M. Boie [illegible] many individuals in lat. 60° (Temm.). To these localities must be added the Mediterranean, if M. Temminck is right, and his opinion does not seem to have been [illegible] formed, in considering *Ph. Desmarestii* and *Ph. cristatus* identical. Indeed Mr. Gould mentions the Mediterranean as a locality of the latter. M. Temminck remarks that [illegible] Japanese species, which in certain points resembles *P. cristatus*, differs, notwithstanding, essentially from it, especially in the extremely slender form of the bill, the [illegible] of the plumage, and the totally different form of the crest.

Plotus. (Linn. Klein.)

Generic Character.—*Bill* longer than the head, [illegible] straight, firm though slender, obliquely dentilated on the edges, which are bent inwards, and terminating in a very sharp point. *Face* and *throat* naked. *Nostrils* [illegible] *Feet* short and robust. *Wings* short; second, third, [illegible] fourth quills longest; tail very long, the feathers stiff and elastic.

This is the genus *Anhinga* of Brisson; *Plottus* of Sco[illegible] and *Ptinx* of Mœhr.

Geographical Distribution of the Genus.—Species of *Plotus*, or *Darter*, as it has been called by English and American ornithologists, are found in the Old and New Continents.

These extraordinary birds are well described by B[illegible] when he says, 'The Anhinga offers us a reptile graft[illegible] the body of a bird.' Those who have seen the long [illegible] and that only, issuing from the water, twisting about [illegible] the herbage and among the foliage, say that a casual observer might well take it for a snake. Vaillant states that the neck of the species seen by him in Africa was always [illegible] oscillation when the bird was perched; and that any one who saw its tortuous movements among the foliage, the body being concealed, would take it for one of the tree serpents. The form indeed was considered by the [illegible] voyagers as a monster partaking of the nature of the [illegible] and the duck; and Wilson states that in some ancient charts which he had seen, the creature was delineated with all the extravagance of fiction. In flight the neck is stretched out, immoveable, in a line with the body.

AFRICAN DARTERS, OR SNAKE-BIRDS.

Plotus Levaillantii.—(*Nuptial Plumage.*)—Bill [illegible] feet yellow; all the upper part of the head and back of head brick-red, bordered with a riband of black [illegible] descends to the shoulders; forehead, cheeks, and sides of the neck pure white; throat and anterior part of the [illegible] pale ochraceous yellow; breast and all the under parts of the body deep black with greenish reflections; the [illegible] part of the neck above the back reddish and ocellated with white; the whole of the mantle and the small [illegible] brown, with the middle of each feather of a bright [illegible] colour; tail-feathers and quills brown, some of the [illegible] terminated with rust-colour.

This is *Plotus Africanus* of Swainson.

Habits.—Le Vaillant in his usual lively style [illegible] how he was induced to visit a rich proprietor in the [illegible] canton of the Twenty-four Rivers to the north east of [illegible] land (South Africa), after he had determined on [illegible] ping, by the tempting description of two extraordinary [illegible] which habitually haunted the vicinity of this proprietor's habitation, and which, from the description, he knew [illegible] be Anhingas. They frequented a particular tree, [illegible] baffled him more than once; at length he got within [illegible] and killed them both, right and left. His Hottentots [illegible] them *Slange-Hals-Voogel* (bird with a serpent's [illegible] He describes them as diving 'entre deux eaux' for [illegible] when they caught a small one it was swallowed whole, [illegible] they captured a large one it was carried to a rock or [illegible] trunk of a tree, and the bird, fixing it beneath its [illegible] picked it to pieces with its bill. Though the water is [illegible] favourite element, it is upon trees or rocks, he tells us, [illegible] it establishes its nest and brings up its young, taking [illegible] to place it so that they may be easily precipitated [illegible] river, as soon as they are able to swim, or whenever [illegible] safety of the little family requires it. He describes [illegible] most difficult of approach, especially when swimming, [illegible] when nothing but the head is to be seen; the instant the flint struck the steel the bird dived, and often when it was looked for a-head, it had doubled back in its diving, and then took wing far behind the sportsman.

Localities.—Senegal, Cape of Good Hope; part of the coasts of Asia (Lesson).

Plotus Levaillantii.

AMERICAN DARTERS.

Example, Plotus Anhinga—Plotus Americanus (Sw.).

Description.—*Male.*—*Bill* 3½ inches long, rather slender, very sharp pointed, and armed with numerous sharp teeth towards the tip, for the securing its prey; black above, yellow below; bare space round the eye and pouch under the chin yellow; slit of the mouth extending beyond the eye; irides vivid red; head, neck, and all the lower parts black glossed with dark green; side of the neck, from the eye backwards for more than half its length, marked by a strip of brownish-white, consisting of long hair-like tufts of plumage extending an inch beyond the common surface, resembling the hair of callow young; a few small tufts on the crown; the whole upper parts black, marked in a very singular and beautiful manner with small oval spots and long pointed streaks of a lively white which has the gloss of silver in some lights; middle of the back, primaries, secondaries, rump, and tail-coverts plain glossy black; on the upper part of the back the white is in very small oval spots lengthening as they approach the scapulars and tertials, on the latter they extend the whole length of the feathers, running down the centre (these are black shafted); the wings long and pointed; lesser coverts marked on every feather with an oval or spade-shaped spot of white; greater coverts nearly all of a hoary-white; tail long, rounded, and exceedingly stiff, consisting of 12 broad feathers, the exterior vanes of the four middle ones curiously crimped, the whole black and broadly tipped with dirty brownish-white; thighs black; legs scarcely an inch and a half long; feet webbed, all the four toes united by the membrane, which is of uncommon breadth; exterior toe the longest, 3 inches; claws horn-colour, strong and crooked, inner side of the middle one pectinated; legs and feet yellow. All the plumage very stiff and elastic; that of the neck and breast shorter, soft, and shining. Length 2 feet 10 inches.

Female—differs in having the neck before of a cream colour or iron-grey, the breast the same, but lighter and tinged with pale chestnut; belly as in the male; where the iron-grey joins the black on the belly, there is a narrow band of chestnut; upper head and back of the neck dark sooty-brown streaked with blackish; cheeks and chin pale yellow-ochre; in every other respect the same as the male, except in having only a few slight tufts of hair along the sides of the neck; tail 12 inches long to its insertion, generally spread out like a fan, and crimped, like the other, on the two outer vanes of the two middle feathers only. Length 2 feet 9 inches. (Wilson.)

Habits.—"Here is in this river (St. Juan, East Florida) and in the waters all over Florida, says Bartram, speaking of this species, 'a very curious and handsome bird; the people call them snake-birds; I think I have seen paintings of them on the Chinese screens and other Indian pictures; they seem to be a species of Colymbus, but far more beautiful and delicately formed than any other that I have ever seen. They delight to sit in little peaceable communities, on the dry limbs of trees hanging over the still waters, with their wings and tails expanded, I suppose to cool and air themselves, when at the same time they behold their images in the watery mirror. At such times, when we approach them, they drop off the limbs into the water as if dead, and for a minute or two are not to be seen; when on a sudden, at a great distance, their long slender head and neck appear, like a snake rising erect out of the water; and no other part of them is to be seen when swimming, except sometimes the tip end of their tail. In the heat of the day they are seen in great numbers, sailing very high in the air over lakes and rivers. They inhabit the waters of Cape Fear River, and, southerly, East and West Florida.'

Mr. Abbot, of Georgia, who agrees with Wilson in opinion that *P. Anhinga* is the female of the black-bellied Darter, gives its length as 36 inches, extent 40; and says, 'These birds frequent the ponds, rivers, and creeks during the summer; build in the trees of the swamps, and those of the islands in the ponds; they construct their nests of sticks; eggs of a sky blue colour. I inspected a nest, which was

Plotus Anhinga, male.

Plotus Anhinga, female. (Wilson.)

not very large; it contained two eggs and six young ones, the latter varying much in size; they will occupy the same tree for a series of years. They commonly sit on a stump which rises out of the water, in the mornings of the spring, and spread their wings to the sun, from which circumstance they have obtained the appellation of Sun-birds. They are difficult to be shot when swimming, in consequence of only their heads being above the water.'

Localities.—The Carolinas, Georgia, and the Floridas; common in Brazil and Cayenne.

Fregata. (Ray.)

Generic Character.—*Bill* long, robust, strong, trenchant, depressed at the base, widened on the sides, with a suture above, the mandibles very much hooked at the point, and the gape very wide; *nostrils* linear; orbits naked; throat dilatable. *Wings* very long and very narrow, two first *quills* very long. *Feet* short; the toes united by a membrane which is deeply notched. This is the genus *Tachypetes* of Vieillot.

The *Man-of-War Birds*, or *Frigates*, are eminently raptorial. Ray speaks of their eagle-eye, vulturine claws, and kite-like glidings. Their immense extent of wing and dashing habits have obtained for them the name of the swiftest sailing ships of war that sweep the seas.

Mr. Vigors (*Linn. Trans.*, vol. xiv.), who, as we have seen, considers *Phaeton* and the genus before us as belonging to this family, observes that in those genera we find a still more immediate approach than we find in the closely allied cormorants to the birds of prey, in their raptorial habits, their soaring and aerial flight, and the rapid seizure of their prey without immersing themselves in the waters where they seek it. '*Tachypetes* in particular,' says Mr. Vigors, 'exhibits in its general habits and structure the most conclusive evidence of this affinity, and of its deviation at the same time from the *Natatores*. Although for the most part it pursues its habits of rapine at immeasurable distances from the shore, and derives its support exclusively from the ocean, it is never known to rest upon its surface. It does not possess in fact, to a sufficient extent, those glands which by their oily secretions preserve the plumage of other oceanic birds from the effects of the water; while the extreme disproportion of its hinder extremities deprives it of the power of either swimming or walking. On observing the structure of its legs, we immediately detect this deficiency. Short, weak, and feathered down to the toes, they are equally unsuited to the land and the water. Its powers of motion and the characters by which it maintains its station in nature are in fact centred in its wings. Supported in its unlimited flights by the strength and expansion of these members, and aided by the singular mechanism of its tail and the buoyant nature of the inflated sac which distends its throat, it seems to be an inhabitant of the air rather than of the land, where it resorts alone for the duties of its nest, or of the water, over which it only hovers for its prey. These extraordinary and strongly marked characters, by which it thus appears as it were to fluctuate between the confines of the two orders before us, did not escape the penetrating eye of Linnæus, who, by the name of *Pelecanus Aquilus* which he assigned it, pointed out at once its place among the *aquatic* birds and its vicinity to the aquiline.'

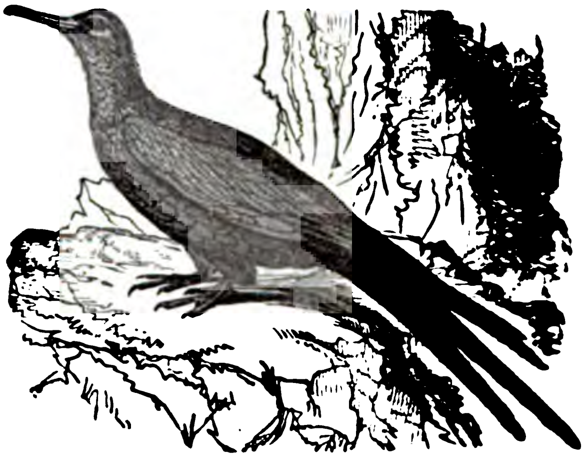
The best and perhaps the only satisfactorily defined species is that just above mentioned.

Description.—Tail forked, body black, bill red, orbits black. The male is entirely black: abdomen of the female white. Some accounts state the extent of the wings to be fourteen feet, an almost incredible expanse.

Habits.—Sloane, who saw them at Jamaica, describes them under the name of *Men-of-War Birds*, as appearing in the bay near Port Royal. 'They fly,' says he, 'like kites, look black, are very large winged in proportion to their body; they fight with sea-gulls (which are to be found here, and are like ours) for their prey.' It is however but an unequal fight, for the poor gull has not much chance when opposed to the swoop of the *Frigate*. The same author gives a much more detailed account of their habits afterwards (p. 30). He saw them together with *Tropic Birds* when he came into lat. 13° 10′. 'This bird,' remarks Sloane, in his section *Of Men-of-War Birds*, 'seems very large, bigger than a kite, and black; they fly, like kites, very high, and often appear immoveable over the water, to wait for and catch small fish appearing on the surface: they are sharp winged and their tail is forked. When flying-fishes are persecuted under water by dolphins, bonitos, &c., they rise and fly for some space in the air, and are often devoured by these birds in that time. We saw them first when we came near Barbados. The sailors guess themselves not many days, or about two hundred leagues, off the islands when they spy them first; and it is wondered how they can direct their course to the land at nights, being so far distant: but it seems no very strange matter, because they are very high in the air, and can see land much farther than those on the deck or topmast of a ship. The reason of their flying so high may be to have a greater field before them for prey, because they may go where they see the dolphins follow or hunt the flying-fishes. They are commonly thought in the West Indies to foretel the coming in of ships, for when they see a Man-of-War Bird come into their ports, they reckon ships will soon follow, and it is very often true, for they love to fish in not very rough weather, so that when it blows hard at sea, they come into the ports and bays to fish, where the wind is broken off by the land, and the same wind blowing them in brings in the shipping after them. There are more of these in the firm land of America than in the isles. One of these birds at Panama coming to take sardinas that were a curing in the sun, a negro broke his wing with a stick he had in his hand: the body, after it was clear of its feathers, was little bigger than a pigeon. The wings being extended, no man, though several tried, could reach, with his arms stretched out, within four inches of the tips of them.' The fat was considered by the Indians and others a sovereign remedy in some diseases, such as sciatica, &c.

The nest is said to be built on rocks in small desert islands, on lofty cliffs, or in high trees in retired situations near the sea. The eggs are stated to be one or two in number, and to be of carnation tinge and dotted with crimson. The newly hatched young are said to be covered with a grey down. For the tyranny with which the *Frigate* treats the unfortunate *Gannets*, see the article BOOBY, vol. v., p. 16[illegible]

Geographical Distribution.—Very common on the intertropical American coasts, and in the Atlantic and *Pacific* oceans, but always within reach of land.



Frigate, or Man-of-War Bird: the gular pouch not dilated.

PELECANOI'DES. [PETRELS.]

PELECA'NOPUS. [TERNS.]

PELECA'NUS. [PELECANIDÆ.]

PELEW ISLANDS are a chain of small islands situated in the Pacific, between 8° and 9° N. lat. and between [illegible] and 136° E. long. They extend from south-south-west to north-north-east. The group is enclosed by a reef, which surrounds it in the form of a crescent almost entirely on the west and north, and even from the east it is difficult to approach the islands on account of the reefs. There is no reef on the south, but there are several shoals of coral-rocks. The group consists of more than twenty islands of moderate extent, which are narrow and long. The largest is the island of Babeltoup, which may be nearly 60 miles in circumference. The islands of Oroorong, Cooroora, and A[illegible]tingall are much smaller. A considerable part of their surface is covered with hills, between which there are pretty extensive valleys, generally with a rich soil. The hills are covered with high trees. There are no rivers in the islands, but the inhabitants are supplied with water from brooks and ponds. When Captain Wilson was shipwrecked [illegible] there in 1783, he found no quadrupeds except rats; but now there are cattle, goats, and hogs. The sheep that were carried there have all been killed by the inhabitants for some unknown reason, but the hogs and goats thrive well. Cattle are stated to have become abundant, which is probable, as Captain Wilson found many tracts covered with grass. The vessels which make the outer passage to Canton stop at these islands for provisions. Wild fowl is numerous. There is also a large kind of blue pigeon, and a bat of enormous size. Several kinds of fish are plentiful, and some of them are of great size; sharks are common. Turtles abound, as well as shell-fish, such as oysters, mussels, and others. The principal objects of cultivation are yams, bananas, and cocoa-nut trees; but the sugar-cane and turmeric are also raised. There are betel-nut-trees, oranges, and limes, but they are not abundant. The bamboo and the bread-fruit tree grow wild in the forests, and also the cabbage-tree and a tree the fruit of which resembles almonds. The forests contain ebony, and many timber-trees of great size; a single tree is frequently converted by the inhabitants into a boat capable of carrying 25 or 26 men.

The inhabitants are a tribe of Malays. They are very good-natured, and received Captain Wilson and his crew with great kindness. They wear no clothes, and drink only water and the juice of the cocoa-nut and of the sugar-cane without distillation. Their huts are made in a very simple way, but they show some ingenuity in the construction of their boats. Their cooking utensils are made of clay, and are burned in the same manner as our coarse pottery.

(Keate's *Account of the Pelew Islands*; and Delano's *Narrative of Voyages and Travels*.)

PELICAN. [PELECANIDÆ.]

PELIDNA. [TRINGINÆ.]

PELION, MOUNT. [THESSALY.]

PELIUS. [VIPERIDÆ.]

PELL, JOHN, an eminent English mathematician, descended from an ancient family in Lincolnshire, was born at Southwick in Sussex, March 1st, 1610, where his father was minister. From an astrological horoscope, preserved among Ashmole's collections at Oxford, we learn that he was born at 21 minutes after one o'clock in the noon of that day. He received his grammar education at the free-school of Steyning in Sussex, and made so rapid a proficiency in the Latin, Greek, and Hebrew languages, that at the early age of thirteen he was sent to Trinity College, Cambridge. He never offered himself however a candidate at the election of scholars or fellows of his college. In 1631 he was admitted to an *ad eundem* degree in the university of Oxford, having proceeded to the degree of master of arts at Cambridge the previous year. In 1632 he married Ithamaria, second daughter of Mr. Henry Reginolles, of London, by whom he had four sons and four daughters. During this time he had acquired a mathematical reputation by the publication of several works, and when a vacancy occurred in the mathematical chair at Amsterdam, in 1639, Sir William Boswell, the English resident with the States-general, used his interest that he might succeed to that professorship. It was not filled up however till 1643, when Pell was chosen; and he greatly distinguished himself in this situation by his lectures on Diophantus, and on various other parts of the mathematics. In 1646, on the invitation of the Prince of Orange, he removed to the new college at Breda, as professor of mathematics, with a salary of 1000 guilders per annum. In 1652 he returned to England, but in two years afterwards, in 1654, he was chosen, by the protector Cromwell, agent to the Protestant cantons in Switzerland. He continued in Switzerland till June 23, 1658, when he set out for England, where he arrived about the time of Cromwell's death. His diaries and correspondence during this period are still preserved among the Lansdowne manuscripts in the British Museum, and are particularly curious and valuable for the history of this period. His negotiations abroad gave afterwards general satisfaction, as it appeared he had done no small service to the interest of King Charles II. and of the church of England. Having entered holy orders, he was instituted, in 1661, to the rectory of Fobbing in Essex, with the chapel of Bartlesden annexed, on the presentation of the king. In 1673 he was presented, by Dr. Sheldon, then bishop of London, to the rectory of Laindon in Essex; and about the same time he took the degree of doctor of divinity. Shortly afterwards his patron was translated to the archbishopric of Canterbury, and made him one of his domestic chaplains. Such an appointment is generally considered to be a step to higher preferment, but Dr. Pell was so intent on the philosophical and mathematical sciences, that he neglected his own interest, and was so imprudent with respect to the management of his worldly affairs, that he would have disgraced the station of a dignitary. Anthony Wood says that 'he was a shiftless man, and his tenants and relations dealt so unkindly with him, that they cozened him of the profits of his parsonages, and kept him so indigent that he wanted necessaries, and even paper and ink, to his dying day.' In the midst of his incessant application to his studies, owing to the neglect of his affairs his embarrassments increased, and he contracted debts which proved the occasion of his being twice in the King's Bench prison. Being at length reduced to great indigence, he was invited by Dr. Whistler, in March, 1682, to live in the college of physicians. Here he continued only for a few months, the ill state of his health rendering it advisable for him to remove to the house of a grandchild of his in St. Margaret's, Westminster. He afterwards removed to the house of Mr. Cothorne, reader of the church of St. Giles's in the Fields, where he died, on the 12th of December, 1685, in the seventy-fourth year of his age, and was interred at the expense of Dr. Busby, master of Westminster school, and Mr. Sharp, rector of St. Giles's, in the rector's vault under that church.

Dr. Pell's reputation as an algebraist and mathematician was great in his own time, and he deservedly holds a high position in the history of the mathematics of the seventeenth century. It was to Pell that Newton first developed his invention of fluxions; and the original letter containing his method, which was printed in the 'Commercium Epistolicum,' has been recently discovered by the late Professor Rigaud in the library of the earl of Macclesfield. Dr. Pell published the following works:—

1. 'A Refutation of Longomontanus's Discourse, De vera Circuli Mensura,' 4to., Amst., 1644, 2pp.

2. 'A Letter to Theodore Haak concerning Easter,' 4to., Lond., 1664. The original manuscript is in the British Museum, MS. Sloan., 4419. This is merely in favour of what was then called the New Style, and consists only of seven pages.

3. 'An Idea of the Mathematics.' Printed at the end of Mr. John Durie's 'Reformed Library-keeper.'

4. 'A Table of Ten Thousand Square Numbers, viz. of all the Square Numbers between 0 and 100 millions, and of their Sides or Roots, which are all the whole numbers between 0 and ten thousand,' fol., Lond., 1672. *Ff.* 16.

5. 'Rhonius's Algebra, translated out of the High Dutch into English by Thomas Branker, much altered and augmented by Dr. John Pell,' 4to., London, 1668. In this work Dr. Pell first invented the mode of registering the steps of difficult equations, which was then adopted by several writers, but has now fallen out of use; the last work that we know of which contains it is Butler's 'Introduction to the Mathematics,' published in 1815. Here also he introduced the character ÷ for division, which is now employed.

6. 'An Essay on the Day Fatality of Rome.' Printed in Aubrey's 'Miscellanies,' edit. 1721, p. 22.

Besides these, he published several single-leaf controversial pamphlets, the titles of which we have not been able to ascertain. His manuscripts and letters still remaining are numerous, and perhaps in no similar instance have papers been so carefully preserved. In the British Museum alone are nearly forty folio volumes, none of them very small, of his letters and mathematical scraps. These were supposed by Dr. Hutton to have been deposited in the library of the Royal Society, but it has been shown (Halliwell's *Life of Sir S. Morland*, p. 27-30) that they are all deposited in the Birch collection of manuscripts in the British Museum, with the exception perhaps of a few manuscript letters. In the Harleian collection there are three other similar volumes, which no doubt belonged to the same, and it is difficult to say how they could have been transferred to that library. Dr. Hutton says that he left some of his manuscripts at Brereton in Cheshire, where he resided some time, being the seat of William Lord Brereton, who had been his pupil at Breda. In August, 1644, he was preparing for the press a new edition of Diophantus, one of his most favourite books, in which he intended to correct the translation and make new illustrations, but this project was never perfected.

He designed likewise to publish an edition of Apollonius, but laid it aside in May, 1645, at the desire of Golius, who was engaged in an edition of that author from an Arabic manuscript given him at Aleppo eighteen years before. Pell's letters in the Royal Society are addressed principally to Cavendish; and one out of the series has accidentally found its way into a manuscript in the British Museum, MS. Harl., 6796.

PELLA. [MACEDONIA.]

PELLA'GRA is a disease chiefly affecting the skin, and particularly prevalent amongst the peasantry of the north of Italy. According to Dr. Holland (whose description, in the 8th volume of the 'London Medico-Chirurgical Transactions,' is by far the best that has been published in this country), the disease affects the poor almost exclusively, and among them chiefly those who are occupied in the culture of the irrigated rice-grounds, and in other parts of agricultural labour. It usually appears first as a disease of the skin, breaking out early in the spring, with slightly elevated shining dark-red blotches on the hands and feet, and sometimes on other parts of the body, accompanied by a slight pricking sensation. Soon after, small tubercles arise upon the inflamed blotches, and the skin becomes dry and scaly, and often deeply cracked. Desquamation gradually takes place, and, towards the close of the summer, or even earlier, the skin usually appears quite recovered. This, at least, is the usual progress of the first attack; and there is seldom any greater general disturbance of the health than debility, irregular pains of the body, loss of appetite, and emaciation.

In the next spring however the disease usually recurs, with a great aggravation of both the local and the general symptoms, and especially with an increase of the nervous affection, and great anxiety and despondency. In succeeding years it regularly returns with increased severity in every spring, though it does not, as at first, leave the patient nearly healthy in the autumn and winter. After the third attack, or sometimes later, the weakness of the patient commonly becomes extreme, and he has many symptoms similar to those of scurvy, with constant diarrhœa, dropsical swellings, and various nervous disorders. Its most marked character however is the total despair which fills the patients' minds, from which nothing can rouse them, and which, if the disease does not prove fatal by its effects in debilitating their bodies, generally leads to incurable idiotcy or mania. In the lunatic hospital at Milan, Dr. Holland found, among 500 patients, more than one-third in whom the insanity had been the result of pellagra, and 'even this statement gives little adequate idea of the nature of its ravages. The public hospitals are far from sufficient to receive the vast number of persons affected with the pellagra; and the greater proportion perish in their own habitations, or linger wretched spectacles of fatuity and decay.' The period during which the disease may continue is uncertain; but after the third or fourth year, there is usually little hope of benefit from any means that can be adopted. The diseases to which, in its later stages, it may lead, or with which it may be complicated, are of the most varied kinds; and there are few which, in different cases, the Italian physicians do not ascribe to its influence.

The pellagra prevails chiefly in the provinces of Lombardy between the Alps and the Po, and especially in the district between the Lago Maggiore and the Lago di Como. Among the inhabitants of these parts it has now been supposed to have existed for upwards of a century: here it appears first to have become an object of attention to physicians, and hence to have spread slowly to the Venetian and other northern provinces. It is distinctly an hereditary disease; but there is no sufficient evidence for believing it to be propagated by contagion. Its origin and prevalence are rather to be referred to the condition of poverty in which the peasantry, though the cultivators of one of the most fertile countries in Europe, are compelled to live. Their ordinary diet consists of vegetables, which are usually of inferior quality and ill-prepared: their bread, which is principally made of maize, is for the most part ill-fermented, and often deficient in salt. They rarely have any animal food, and their poverty almost entirely precludes the use of the wines of their own country. Similar wretchedness is evident in their clothing, in their dwellings, and in the deficiency of all the commonest comforts of life. They are thus constantly predisposed to the attacks of diseases of all kinds, and especially are unfit for exposure to the influence of a burning sun during severe agricultural labour. Hence the disease usually makes its first appearance when the peasants are at their most active work, and when the heat of the days is increasing; and hence it is usually first characterised by a disease of the skin, which however is but a slight indication of its future more serious and varied effects.

The treatment of pellagra offers little prospect of success so long as the patient remains exposed to the same influences by which he was rendered subject to its attack. The course usually adopted by the Italian physicians for the patients who are admitted into the hospitals is a liberal allowance of wholesome food, and the administration of wine and of tonics of various kinds. There seems little reason to doubt that if wholesome food could be constantly secured for the poor, the pellagra would speedily disappear from all the districts in which it now so fatally prevails.

PELLO'RNEUM (Ornithology), Mr. Swainson's name for a genus of *Crateropodinæ*, or *Babblers*. [MERULIDÆ.]

PELOKONITE, a mineral which occurs amorphous. No cleavage. Fracture conchoidal. Hardness 3. Brittle, but not remarkably so. Colour bluish-black. Streak liver-brown. Lustre vitreous, nearly dull. Opaque. Specific gravity 2·567. Soluble in hydrochloric acid; solution of a yellowish-green colour, and contains phosphoric acid, iron, manganese, and copper.

PELO'PIDAS, the son of Hippoclus, belonged to one of the principal families of Thebes. He distinguished himself at the battle of Mantineia (B.C. 385), in which the Thebans took part as allies of the Lacedæmonians under the Spartan king Agesipolis. In this battle Pelopidas, being wounded and thrown down, was saved from death by Epaminondas, who protected him with his shield, maintaining his ground against the Arcadians until the Lacedæmonians came to their relief and saved both their lives. From that time a close friendship was formed between Epaminondas and Pelopidas, which lasted till the death of the latter. When the Lacedæmonians surprised the citadel of Thebes and established the power of the aristocracy in that city, Pelopidas, who belonged to the popular party, retired to Athens, together with a number of other citizens. After a time he and his brother exiles formed a plan with their friends in Thebes for surprising and overthrowing the oligarchy, and restoring the popular government. Pelopidas and some of his friends set off from Athens disguised as hunters, found means to enter Thebes unobserved, and concealed themselves in the house of a friend, from whence they issued in the night, and having surprised the leaders of the aristocratic party, put them to death. The people then rose in arms, and, having proclaimed Pelopidas their commander, they obliged the Spartan garrison to surrender the citadel by capitulation (B.C. 379).

Pelopidas soon after contrived to excite a war between Sparta and Athens, and thus divide the attention of the former power. The war between the Thebans and the Lacedæmonians was carried on for some years in Bœotia by straggling parties, and Pelopidas, having obtained the advantage in several skirmishes, ventured to encounter the enemy in the open field at Tegyræ near Orchomenus. The Lacedæmonians were defeated, and thus Pelopidas demonstrated for the first time that the armies of Sparta were not invincible, a fact which was afterwards confirmed by the battle of Leuctra (B.C. 371), in which Pelopidas fought under the command of his friend Epaminondas. [EPAMINONDAS.] In the year 369 B.C., the two friends, being appointed two of the Bœotarchs (Plut., *Pelop.*, c. 24), marched into Peloponnesus, obliged Argos and Arcadia and other states to renounce the alliance of Sparta, and carried their incursions into Laconia in the depth of winter. Having taken Messenia, they invited the descendants of its former inhabitants, who had gone into exile about two centuries before, to come and repeople their country. They thus reduced the power of Sparta to the boundaries of Laconia. Pelopidas and Epaminondas, on their return to Thebes, were tried for having retained the command after the expiration of the year of their office, but were acquitted. Pelopidas was afterwards employed against Alexander, tyrant of Pheræ, who was endeavouring to make himself master of all Thessaly, and he defeated him. From Thessaly he was called into Macedonia, to settle a quarrel between Alexander, king of that country and son of Amyntas II., and his natural brother Ptolemy. Having succeeded in this, he returned to Thebes, bringing with him Philip, brother of Alexander, and thirty youths of the chief families of Macedonia as hostages. A year after he very Ptolemy murdered his brother Alexander and took possession of the throne. Pelopidas, being applied to by the friends of the late king, enlisted a band of mercenaries, with which he marched against Ptolemy, who entered into an agreement to hold the government only in trust for Perdiccas, a younger brother of Alexander, till he was of age, and to keep the alliance of Thebes; and he gave to Pelopidas his own son Philoxenus and fifty of his companions as hostages. Some time after, Pelopidas, being in Thessaly, was treacherously surprised and made prisoner by Alexander of Pheræ, but the Thebans sent Epaminondas with an army, who obliged the tyrant to release Pelopidas. The Thebans soon after, having discovered that the Spartans and Athenians had sent ambassadors to conclude an alliance with Artaxerxes, king of Persia, sent on their part Pelopidas to support their own interest at that court. His fame had preceded him, and he was received by the Persians with great honour, and Artaxerxes showed him peculiar favour. Pelopidas obtained a treaty, in which the Thebans were styled the king's hereditary friends, and in which the independence of each of the Greek states, including Messenia, was recognised. He thus disappointed the ambition of Sparta and of Athens, which aimed at the supremacy over the rest. The Athenians were so enraged at this, that they put their ambassador Timagoras to death on his return to Athens. Pelopidas after his return was appointed to march against Alexander of Pheræ, who had committed fresh encroachments in Thessaly. But while the army was on the point of starting, an eclipse of the sun took place, which dismayed the Thebans, and Pelopidas was obliged to set off with only 300 volunteers, trusting to the Thessalians, who joined him on the march. Alexander met him with a large army at a place called Cynoscephalæ. Pelopidas, by great exertions, although his army was much inferior in numbers, obtained an advantage, and the troops of Alexander were retreating, when Pelopidas, venturing too far amidst the enemy, was killed.

The grief of both Thebans and Thessalians at this loss was unbounded; they paid splendid funeral honours to his remains. The Thebans revenged his death by sending a fresh army against Alexander, who was defeated, and was soon after murdered by his own wife.

Pelopidas was not only one of the most distinguished and successful commanders of his age, but he and his friend Epaminondas rank among the most estimable public men of antient Greece.

(*Plutarch*, *Pelopidas*; Xenophon, *Hellenica*; Pausanias, ix. 13, &c.)

PELOPONNESIAN WAR is the name given to the great contest between Athens and her allies on the one side, and the Peloponnesian confederacy, headed by Sparta, on the other, which lasted from 431 to 404 B.C. The political state of Greece at the commencement of the war has been briefly described under GREECE [vol. xi., p. 427]. The war was a consequence of the jealousy with which Sparta and Athens regarded each other, as states each of which were aiming at supremacy in Greece, as the heads respectively of the Dorian and Ionian races, and as patrons of the two opposite forms of civil government, oligarchy and democracy. The war was eagerly desired by a strong party in each of these states; but it was necessary to find an occasion for commencing hostilities, especially as a truce for thirty years had been concluded between Athens and Sparta in the year B.C. 445. Such an occasion was presented by the affairs of Corcyra and Potidæa. In a quarrel which soon became a war between Corinth and Corcyra, respecting Epidamnus, a colony of the latter state (B.C. 435), the Corcyreans applied to Athens for assistance. Their request was granted, as far as the conclusion of a defensive alliance between Athens and Corcyra, and an Athenian fleet was sent to their aid, which however soon engaged in active hostilities against the Corinthians.

Potidæa, on the isthmus of Pallene, was a Corinthian colony, and even after its subjection to Athens continued to receive every year from Corinth certain functionaries or officers (ἐπιδημιουργοί). The Athenians, suspecting that the Potidæans were inclined to join in a revolt to which Perdiccas, king of Macedon, was instigating the towns of Chalcidice, required them to dismiss the Corinthian functionaries, and to give other pledges of their fidelity. The Potidæans refused, and, with most of the other Chalcidian towns, revolted from Athens, and received aid from Corinth. The Athenians sent an expedition against them, and, after defeating them in battle, laid siege to Potidæa (B.C. 432).

The Corinthians now obtained a meeting of the Peloponnesian confederacy at Sparta, in which they complained of the conduct of Athens with regard to Corcyra and Potidæa. After others of the allies had brought their charges against Athens, and after some Athenian envoys, who happened to be in the city, had defended the conduct of their state, the Spartans first, and afterwards all the allies, decided that Athens had broken the truce, and they resolved upon immediate war; king Archidamus alone recommended some delay. In the interval necessary for preparation, an attempt was made to throw the blame of commencing hostilities upon the Athenians, by sending three several embassies to Athens with demands of such a nature as could not be accepted. In the assembly which was held at Athens to give a final answer to these demands, Pericles, who was now at the height of his power [PERICLES], urged the people to engage in the war, and laid down a plan for the conduct of it. He advised the people to bring all their moveable property from the country into the city, to abandon Attica to the ravages of the enemy, and not to suffer themselves to be provoked to give them battle with inferior numbers, but to expend all their strength upon their navy, which might be employed in carrying the war into the enemies' territory, and in collecting supplies from the subject states; and further, not to attempt any new conquest while the war lasted. His advice was adopted, and the Spartan envoys were sent home with a refusal of their demands, but with an offer to refer the matters in difference to an impartial tribunal, an offer which the Lacedæmonians had no intention of accepting. After this the usual peaceful intercourse between the rival states was discontinued.

Thucydides (ii. 1) dates the beginning of the war from the early spring of the year 431 B.C., the fifteenth of the thirty years' truce, when a party of Thebans made an attempt, which at first succeeded, but was ultimately defeated, to surprise Platæa. The truce being thus openly broken, both parties addressed themselves to the war. The Peloponnesian confederacy included all the states of Peloponnesus, except Achæa (which joined them afterwards) and Argos, and without the Peloponnesus, Megaris, Phocis, Locris, Bœotia, the island of Leucas, and the cities of Ambracia and Anactorium. The allies of the Athenians were Chios and Lesbos, besides Samos and the other islands of the Ægean which had been reduced to subjection (Thera and Melos, which were still independent, remained neutral), Platæa, the Messenian colony in Naupactus, the majority of the Acarnanians, Corcyra, Zacynthus, and the Greek colonies in Asia Minor, in Thrace, and Macedonia, and on the Hellespont. The resources of Sparta lay chiefly in her land forces, which however consisted of contingents from the allies, whose period of service was limited; the Spartans were also deficient in money. The Athenian strength lay in their fleet, which was manned chiefly by foreign sailors, whom the wealth that they collected from their allies enabled them to pay.

Thucydides informs us that the cause of the Lacedæmonians was the more popular, as they professed to be deliverers of Greece, while the Athenians were fighting in defence of an empire which had become odious through their tyranny, and to which the states which yet retained their independence feared to be brought into subjection.

In the summer of the year 431 B.C., the Peloponnesians invaded Attica under the command of Archidamus, king of Sparta. Their progress was slow, as Archidamus, their commander, appears to have been still anxious to try what could be done by intimidating the Athenians before proceeding to extremities. Yet their presence was found to be a greater calamity than the people had anticipated; and when Archidamus made his appearance at Acharnæ, they began loudly to demand to be led out to battle. Pericles firmly adhered to his plan of defence, and the Peloponnesians returned home. Before their departure the Athenians had sent out a fleet of one hundred sail, which was joined by fifty Corcyrean ships, to waste the coasts of Peloponnesus; and towards the autumn Pericles led the whole disposable force of the city into Megaris, which he laid waste. In the same summer the Athenians expelled the inhabitants of Ægina from their island, which they colonised with Athenian settlers. In the winter there was a public funeral at Athens for those who had fallen in the war, and Pericles pronounced over them an oration, the substance of which is preserved by Thucydides (ii. 35-46).

In the following summer (B.C. 430) the Peloponnesians again invaded Attica under Archidamus, who now entirely laid aside the forbearance which he had shown the year before, and left scarcely a corner of the land unravaged. This invasion lasted forty days. In the meantime a grievous pestilence broke out in Athens, and raged with the more virulence on account of the crowded state of the city. Of this terrible visitation Thucydides, who himself was a sufferer, has left a minute and apparently faithful description (ii. 46, &c.). The murmurs of the people against Pericles were renewed, and he was compelled to call an assembly to defend his policy. He succeeded so far as to prevent any overtures for peace being made to the Lacedæmonians, but he himself was fined, though immediately afterwards he was re-elected general. While the Peloponnesians were in Attica, Pericles led a fleet to ravage the coasts of Peloponnesus. In the winter of this year Potidæa surrendered to the Athenians on favourable terms. (Thucyd., ii. 70.)

The next year (B.C. 429), instead of invading Attica, the Peloponnesians laid siege to Platæa. The brave resistance of the inhabitants forced their enemies to convert the siege into a blockade. In the same summer an invasion of Acarnania by the Ambracians and a body of Peloponnesian troops was repulsed; and a large Peloponnesian fleet, which was to have joined in the attack on Acarnania, was twice defeated by Phormion in the mouth of the Corinthian Gulf. An expedition sent by the Athenians against the revolted Chalcidian towns was defeated with great loss.

In the preceding year (B.C. 430) the Athenians had concluded an alliance with Sitalces, king of the Odrysæ, in Thrace, and Perdiccas, king of Macedon, on which occasion Sitalces had promised to aid the Athenians to subdue their revolted subjects in Chalcidice. He now collected an army of 150,000 men, with which he first invaded Macedonia, to revenge the breach of certain promises which Perdiccas had made to him the year before, and afterwards laid waste the territory of the Chalcidians and Bottiæans, but he did not attempt to reduce any of the Greek cities. About the middle of this year Pericles died.

The invasion of Attica was repeated in the next summer (428 B.C.); and immediately afterwards all Lesbos, except Methymne, revolted from the Athenians, who laid siege to Mytilene. The Mytilenæans begged aid from Sparta, which was promised, and they were admitted into the Spartan alliance. In the same winter a body of the Platæans, amounting to 220, made their escape from the besieged city in the night, and took refuge in Athens.

In the summer of 427 the Peloponnesians again invaded Attica, while they sent a fleet of forty-two galleys, under Alcidas, to the relief of Mytilene. Before the fleet arrived Mytilene had surrendered, and Alcidas, after a little delay, sailed home. In an assembly which was held at Athens to decide on the fate of the Mytilenæans, it was resolved, at the instigation of Cleon, that all the adult citizens should be put to death, and the women and children made slaves; but this barbarous decree was repealed the next day. [CLEON.] The land of the Lesbians (except those of Methymne) was seized, and divided among Athenian citizens, to whom the inhabitants paid a rent for the occupation of their former property. In the same summer the Platæans surrendered: they were massacred, and their city was given up to the Thebans, who razed it to the ground.

In the year 426 the Lacedæmonians were deterred from invading Attica by earthquakes. An expedition against Ætolia, under the Athenian general Demosthenes, completely failed; but afterwards Demosthenes and the Acarnanians routed the Ambracians, who nearly all perished. In the winter (426-5) the Athenians purified the island of Delos, as an acknowledgement to Apollo for the cessation of the plague.

At the beginning of the summer of 425 the Peloponnesians invaded Attica for the fifth time. At the same time the Athenians, who had long directed their thoughts towards Sicily, sent a fleet to aid the Leontini in a war with Syracuse. Demosthenes accompanied this fleet, in order to act as occasion might offer on the coast of Peloponnesus. He fortified Pylus on the coast of Messenia, the northern headland of the modern bay of Navarino. In the course of the operations which were undertaken to dislodge him a body of Lacedæmonians, including several noble ns, got blockaded in the island of Sphacteria at the mouth of the bay, and were ultimately taken prisoners by Cleon and Demosthenes. [CLEON.] Pylus was garrisoned by a colony of Messenians, in order to annoy the Spartans. After this event the Athenians engaged in vigorous offensive operations, of which the most important was the capture of the island of Cythera by Nicias, early in B.C. 424. This summer however the Athenians suffered some reverses in Bœotia, where they lost the battle of Delium, and on the coasts of Macedonia and Thrace, where Brasidas among other exploits took Amphipolis. [BRASIDAS; THUCYDIDES.]

The Athenian expedition to Sicily was abandoned, after some operations of no great importance, in consequence of a general pacification of the island, which was effected through the influence of Hermocrates, a citizen of Syracuse.

In the year 423, a year's truce was concluded between Sparta and Athens, with a view to a lasting peace. Hostilities were renewed in 422, and Cleon was sent to cope with Brasidas, who had continued his operations even during the truce. A battle was fought between these generals at Amphipolis, in which the defeat of the Athenians was amply compensated by the double deliverance which they experienced in the deaths both of Cleon and Brasidas. In the following year (421) Nicias succeeded in negotiating a peace with Sparta for fifty years, the terms of which were a mutual restitution of conquests made during the war, and the release of the prisoners taken at Sphacteria. The treaty was ratified by all the allies of Sparta, except the Bœotians, Corinthians, Eleans, and Megarians.

This peace never rested on any firm basis. It was no sooner concluded than it was discovered that Sparta had not the power to fulfil her promises, and Athens insisted on their performance. The jealousy of the other states was excited by a treaty of alliance which was concluded between Sparta and Athens immediately after the peace; and intrigues were commenced for the formation of a new confederacy with Argos at the head. An attempt was made to draw Sparta into alliance with Argos, but it failed. A similar overture subsequently made to Athens met with better success, chiefly through an artifice of Alcibiades, who was at the head of a large party hostile to the peace, and the Athenians concluded a treaty offensive and defensive with Argos, Elis, and Mantinea for 100 years (B.C. 420). [ALCIBIADES.] In the year 418 the Argive confederacy was broken up by their defeat at the battle of Mantinea, and a peace, and soon after an alliance, was made between Sparta and Argos. In the year an expedition was undertaken by the Athenians against Melos, which had hitherto remained neutral. The Melians surrendered at discretion: all the males who had attained manhood were put to death; the women and children were made slaves; and subsequently five hundred Athenian colonists were sent to occupy the island. (Thucyd., v. 1

The fifty years' peace was not considered at an end, though its terms had been broken on both sides, till the year 415, when the Athenians undertook their disastrous expedition to Sicily. [ALCIBIADES; SYRACUSE.] After the failure of that expedition (B.C. 413), the war became on the part of Athens a struggle for existence; but even then she put forth energies which might have saved her, but for her own infatuation and the gold which her enemies obtained from Persia. The events of the war, from this period to the battle of Notium (B.C. 407), have been related under ALCIBIADES. The Spartans had now, by the aid of Persian gold, obtained a fleet with which they could cope with Athens on her own element. In the year 406, Conon, who had been appointed, with nine other generals, to succeed Alcibiades, was blockaded in the harbour of Mytilene by the Spartan admiral Callicratidas. His colleagues sailed to his assistance, and completely defeated the Spartans in the battle of Arginusæ. The Spartans now made overtures for peace, which were rejected by the Athenians at the instigation of a demagogue named Cleophon.

In the following year (B.C. 405) Lysander was appointed to the command of the Lacedæmonian fleet. [LYSANDER.] He attacked the Athenians at Ægospotami on the Hellespont at a moment when they were off their guard, and entirely destroyed their fleet. This blow in effect finished the war. Lysander sailed to Athens, receiving as he went the submission of the allies, and blockaded the city, which surrendered after a few months (B.C. 404), on terms dictated by Sparta with a view of making Athens a useful ally by giving the ascendancy in the state to the oligarchical party. [ATHENS.]

The history of the Peloponnesian War was written by Thucydides, upon whose accuracy and impartiality, as far as his narrative goes, we may place the fullest dependence. His history ends abruptly in the year 411 B.C. For the rest of the war we have to follow Xenophon and Diodorus. The value of Xenophon's history is impaired by his prejudices, and that of Diodorus by his carelessness.

PELOPONNE'SUS (Πελοπόννησος), that is, 'the island of Pelops,' the ancient name of the Morea, derived its name from Pelops, who is said by later Greek mythologists to have been of Phrygian origin. Thucydides (i. 9) simply observes that he came from Asia and brought great wealth with him. He married Hippodameia the daughter of Œnomaus, king of Pisa in Elis, and succeeded to his kingdom. He is said to have subsequently extended his dominions over many of the districts bordering upon Elis, whence the whole country obtained the name of Peloponnesus. Agamemnon and Menelaus were descended from him.

The word Peloponnesus does not occur in Homer. The original name of the peninsula appears to have been Apia (Hom. *Il.*, i. 270; iii. 49), and was so called, according to Æschylus (*Suppl.*, 256), from Apis, a son of Apollo, or, according to Pausanias (ii. 5, § 5), from Apis, a son of Telchin and descendant of Ægialeus. When Argos had the supremacy, the peninsula, according to *Strabo* (viii. 371), was sometimes called Argos; and indeed Homer seems to use the term Argos in some cases as including the whole peninsula. (Thucyd., i. 9.)

Herodotus reckoned (viii. 73) Peloponnesus to contain seven different tribes, the Arcadians, Cynurians, Achæans, Dorians, Ætolians, Dryopes, and Lemnians; the four last of which tribes, he says, had migrated from other countries, but the three former were indigenous. We know however, from the traditions in Herodotus, Strabo, and Pausanias, that the Achæans were immigrants. [ACHÆANS.]

In the time of Thucydides (i. 10) the Peloponnesus appears to have been divided into five parts, namely, Laconica, Messenia, Argolis, Achaia, and Arcadia; but in that case, as Pausanias has remarked (v. 1, § 1), Elis, which for many reasons ought to be made a separate division, must have been included in Achaia or Arcadia. Pausanias treated of Peloponnesus in seven separate books, namely, the Corinthiaca, which includes Corinthia and Argolis; Laconica, Messenica, Eliaca, Achaica, and Arcadica. Modern writers usually make six divisions, Achaia, Elis, Arcadia, Argolis, Laconica, and Messenia, to which Sicyonia or Corinthia is sometimes added.

The ancient history of Peloponnesus forms part of the history of Greece. [GREECE, and the references there given.] The physical geography of the country is given under MOREA, ACHAIA, ARCADIA, ARGOS, ELIS, LACONICA, and MESSENIA.

PELOPS. [PELOPONNESUS.]

PELORIS, Poli's name for the animal of the Glycimeris, properly so called, *Cuvier*. [PECTUNCULUS.]

PELORONTA, Oken's name for a form of Nerit. *Nerita Peloronta* of authors. [NERITIDÆ.]

PELORUS, De Montfort's name for a genus of microscopic *Foraminifera*.

PELVIS. [MAN; SKELETON.]

PELUSIUM. [EGYPT.]

PEMBERTON, HENRY, was born at London in the year 1694. After studying the classics under Mr. John Ward, afterwards professor of rhetoric in Gresham College, he attended the lectures of Boerhaave in the university of Leyden, and also resided some time at Paris, where his attention was directed to anatomical manipulation, in which he appears to have excelled. About this time also he became a student in St. Thomas's Hospital, London, in order more effectually to qualify himself for the medical profession, which he was afterwards precluded from following by the delicate state of his health. In 1719 the university of Leyden conferred upon him the degree of doctor of medicine, on which occasion he read his inaugural dissertation entitled 'De Facultate Oculi ad diversas Rerum Conspicuarum Distantias se accommodandi,' Lugd. Bat., 1719, 4to., and confirmed his friendship with Boerhaave, which continued uninterruptedly till the death of the latter in 1738. In 1728 he succeeded Dr. Woodward as professor of physic in Gresham College, when he commenced a course of lectures on chemistry, which were published by his friend Dr. James Wilson in 1771, London, 8vo. At a later period he was requested by the College of Physicians, of which he was early elected a fellow, to remodel their Pharmacopœia; of which, in an improved form, he published a translation in 1746, London, 8vo. He died 9th April, 1771.

Although chemistry, anatomy, and medicine had been his chief objects of study, there were probably few departments of science in which he did not possess more than ordinary knowledge. This was particularly the case in the mathematics and astronomy, with which his writings show that he had considerable acquaintance. Besides editing the edition of Newton's 'Principia' which appeared in 1726, he published,—1, 'Epistola ad Amicum de Cotesii Inventis,' London, 1722, 4to.; 2, 'View of Sir Isaac Newton's Philosophy,' London, 1728, 4to.; and 3, 'Lectures on Physiology,' London, 1773, 8vo. His communications to the Transactions of the Royal Society, of which body he was admitted a fellow, 24th December, 1720, extend from vol. 32 to vol. 62, and among them may be noticed, 1, 'Remarks on an Experiment by which it has been attempted to show the falsity of the common opinion respecting the force of bodies in motion,' 1723; 2, 'On the Locus for three and four lines, celebrated among the ancient Geometers,' 1763; 3, 'Kepler's Method of computing the Moon's Parallaxes in Solar Eclipses demonstrated and extended to all degrees of latitude,' 1771; 4, 'Geometrical Solutions of three celebrated Astronomical Problems,' 1772, &c. Among the MSS. found by his executors were—1, 'History of Trigonometry;' 2, 'Comment on Newton's Principia;' 3, 'Treatise on Spherics and Spherical Projections;' 4, 'Dissertation on the Screw of Archimedes;' 5, 'Principles of Mercator's and Middle Latitude Sailing;' and some others enumerated in Dr. Hutton's 'Dictionary.' His library contained a choice collection of mathematical works, a large proportion of which was purchased at the sale of the library of the Abbé Gallois, which took place during his stay in Paris. The whole of them, together with those of his friend Dr. Wilson, were sold by auction soon after his death. The number of lots was 2585, and the gross proceeds 701*l.* 17*s.* 6*d.* (See *Catalogue*, with price of each lot annexed, in the library of the British Museum.)

(Hutton's *Dictionary*; Ward's *Lives of the Gresham Professors*; Thomson's *History of the Royal Society*, &c.)

PEMBROKE COLLEGE, OXFORD, was founded in the early part of the seventeenth century, on the site of Broadgate Hall, an ancient seminary for students of the civil and canon law. It originally belonged to the priory of St. Frideswide, and is believed to have been the place where the novices of that house received their first education. It was long known by the name of Segrym Hall, or corruptly Segreve Hall. It afterwards received the name of Broadgate, from the width of its entrance. It was one of the purchases which Wolsey attached to his intended college, and at the dissolution was confirmed to Christ Church by King Henry VIII., its rent being then valued at no more than thirteen shillings and four pence. Dr. John Budden, the last principal of Broadgate Hall, died in 1620.

The new foundation took place a few years after this, in consequence of a bequest from Thomas Tesdale, Esq., of Glympton in Oxfordshire. Mr. Tesdale, having bequeathed 5000*l.* to purchase estates for the maintenance of certain fellows and scholars from the free-school of Abingdon in any of the colleges of Oxford, Dr. Abbot, archbishop of Canterbury, and the other trustees, intended at first to place this foundation in Baliol College; and preparations were made, and even a portion of building was undertaken, at Baliol College for the reception and residence of Tesdale's scholars. The design however not having been carried into full effect, they determined to found a new college on the site of Broadgate Hall, and in the meantime estates were purchased for the endowment in Berkshire and Wiltshire. The plan was now assisted by a second benefactor, Richard Wightwick, B.D., some time of Baliol College, and afterwards rector of East Ilsley in Berkshire, who engaged to make over some estates in aid of the endowment.

The corporation of Abingdon next petitioned the king that he would constitute a college within Broadgate Hall, which was accordingly done by letters-patent, dated June 29, 1624, the said college to be known by the name of 'The master, fellows, and scholars of the college of Pembroke, in the university of Oxford, of the foundation of King James, at the cost and charges of Thomas Tesdale and Richard Wightwick.' It received the name of Pembroke from William Herbert, earl of Pembroke, then chancellor of the university, whose interest was liberally employed in its establishment; and it consisted of ten fellows and scholars besides the master. Four of the fellows of Tesdale's foundation are to be chosen from his relatives; two of Wightwick's must be either related to him or bear the same name. The rest are elected from the free-school at Abingdon.

One fellowship, to be held by a native of Jersey or Guernsey, was founded by King Charles I., in 1636. Sir John Benet, K.B., afterwards Lord Ossulstone, endowed two fellowships and two scholarships, about the year 1672, to which all members of the college and others are eligible who are not already on some foundation; and Sir John Philipps, Bart., founded one fellowship and one scholarship in 1749. Several scholarships and exhibitions have also been added by other benefactors. The foundation at present consists of a master, fourteen fellows, and twenty-nine scholars and exhibitioners. The total number of members whose names are on the books of the college is a hundred and eighty.

The benefices in the patronage of this college are, the rectories of Stifford in Essex, Coln St. Dennis in Gloucestershire, Sibson in Leicestershire, St. Aldates in Oxford, Ringshall in Suffolk, and Brinkworth, Codford St. Peter and Lyddiard Millicent, in Wiltshire, with the vicarage of Thurrock Grays in Essex, the donatives of Colnbrook in Berks, and Uxbridge in Middlesex, and the curacies of West Haroldston and Lambston in Pembrokeshire.

Among persons of note educated in this college are Edmund Bonner, bishop of London; Sir Thomas Brown; Carew, earl of Totness; Pym; Blackstone; Shenstone; Dr. Samuel Johnson; and Newcome, archbishop of Armagh.

The greater portion of the buildings of Pembroke College are of a date subsequent to the foundation, but the hall is the same that belonged to Broadgate. The chapel is a late building, consecrated in 1732.

(Chalmers's *Colleges and Halls of Oxford; Oxford Univ. Calendar for* 1840.)

PEMBROKE HALL, CAMBRIDGE, now more generally called **PEMBROKE COLLEGE**, was founded under the name of Valence-Mary, by Mary de St. Paul, the widow of Aymer de Valence, earl of Pembroke, in 1347, when she endowed it with estates for the maintenance of a master, six fellows, and two scholars. King Henry VI. is said to have trebled the revenues of the college by bestowing on it the priory of Linton, with its appurtenances, and the rectory and manor of Soham. His liberality obtained him the name of a second founder.

The present number of fellowships in this college is fourteen, open to all persons, with this limitation, that no more than three shall be filled by natives of the same county,—London and Middlesex however being reputed separate counties. There is also in the election to that fellowship which was established by Archbishop Grindal, formerly master of the college, a preference given to a scholar educated at St. Bees' school in Cumberland. Although there may be no fellowship vacant, yet a candidate is never considered as superannuated. When more than ten of the fellowships are filled, six of the fellows must be in orders.

There are also two by-fellowships, one founded by William Smart, Esq., of Ipswich, with a preference for the scholars on his own foundation in this college; the other founded by Benjamin Lany, D.D., formerly bishop of Ely and master of this college

The scholarships belonging to this college are numerous, viz. six foundation scholarships, of the yearly value of 28*l.* each; eight Greek, seven founded by Thomas Watts, D.D., and the other by Thomas James, Esq. Of these the four senior scholarships are of the yearly value of 14*l.* each, and the four junior of the yearly value of 12*l.* each. Six scholarships, two founded by William Smart, Esq., and four by Ralph Scrivener, Esq., of the yearly value of 5*l.* each, with a preference for those who have been educated at the grammar-school at Ipswich; three, founded by Archbishop Grindal, of the yearly value of 28*l.* each, for scholars educated at St. Bees' school. There are several others founded by Serjeant Moses, who presided over the college during the time of the Commonwealth, of the yearly value of 50*l.* each, for scholars educated at Christ's Hospital, which exhibitions they hold in addition to others, of the yearly value of 60*l.* each, allowed by the governors of the school, one of the yearly value of 70*l.*, founded by Mr. John Holmes, for a scholar educated at Blackrode school in Lancashire; six, founded by Charles Parkin, M.A., formerly rector of Oxburgh in Norfolk, of the yearly value of 50*l.*; of these, five are for scholars of Merchant Tailors' school, and the other for a scholar of the free-school at Bowes in Yorkshire; when there are no candidates, these scholarships are at the free disposal of the master of the college; one, founded by William Stuart, D.D., formerly chancellor of the diocese of Exeter, of the yearly value of 80*l.*, for a superannuated scholar of Merchant Tailors' school; and one, of the yearly value of 6*l.*, founded by Roger Long, D.D. Besides these there are several exhibitions founded by Robert Mapletoft, D.D., formerly master, and by others, to which the college have made such an addition that three sizars may have 12*l.* each yearly. The enjoyment of one scholarship does not preclude a deserving person from holding others on different foundations.

The benefices in the patronage of this college are, the rectories of Rawreth in Essex, Orton Waterville in Huntingdonshire, Cawston and Sall in Norfolk, and Framlingham and Earl Stonham in Suffolk, with the vicarages of Soham in Cambridgeshire, Waresley in Huntingdonshire, and Saxthorp and Tilney in Norfolk.

Among the more eminent members of this foundation may be reckoned the Archbishops Grindal and Whitgift, Bishop Fox, Bishop Ridley, and Bishop Andrews; Spenser, Gray, and Mason, the poets; Dr. Long, one of the masters, an eminent astronomer; Stanley, editor of Æschylus; and the late Right Hon. William Pitt.

Pembroke Hall, situated on the east side of Trumpington Street, consists of two courts of nearly the same dimensions, about 95 feet by 55. The hall which divides the two courts is about 42 feet by 27. On the east side of the inner court is a small detached building, erected for the purpose of containing a large hollow sphere, used as a lecture-room. The chapel was built by Matthew Wren, bishop of Ely, after a design by his nephew Sir Christopher Wren. It was dedicated in 1665.

A copy of the statutes of this college is preserved in the British Museum, in the Harleian MS. 734. The visitor is the queen. The number of members on the boards of the college, March 18, 1840, was 129, four fellowships being vacant.

(Lysons' *Magna Brit.*, Cambr., p. 105-107; Dyer's *Hist. Coll. and Halls of Cambr.; Cambr. Univ. Calendar*, 184[illegible]

PEMBROKESHIRE is a maritime county, forming the extreme west of South Wales: it is bounded on the east by the counties of Carmarthen and Cardigan, on the other sides by St. George's and the Bristol channels. The length from St. David's Head to the borders of Carmarthenshire is [illegible] miles; from Strumble Head on the north coast to St. Gowan's Head on the south, 31 miles. Pembrokeshire is about 150 miles in circumference, with a very irregular coast-line above 100 miles in extent: it contains about [illegible] square miles, or 368,000 acres. The gross population in 1831 was 81,424, being an increase of 9 per cent. on the census of 1821. Haverfordwest, the county town, is [illegible] miles distant from London by the mail-coach road; and its bearing and distance in a direct line is west-half-north [illegible] miles. In amount of population Pembrokeshire is [illegible] fourth of Welsh counties, and forty-first of England and Wales.

Surface; Coast; Rivers.—Pembrokeshire has no very marked features. The surface is generally undulating, without any extensive plains, or mountains of very great elevation. Being surrounded on three sides by the sea, and intersected by the great æstuary of Milford Haven, the course of the rivers is short, and there are consequently none of magnitude. The south-west winds are very injurious to the growth of timber, of which there is little except in sheltered valleys; the want of it gives a barren appearance to many parts of the country where the soil is good. The Precelli mountains, a range running from near Fishguard to the borders of Carmarthenshire, are about 10 miles in length, and attain a height of 1754 feet above the sea. The Trafgarn ridge is 673 feet high. The highest land in the southern district is Bolton Beacon, 327 feet.

The river Teivi runs into the sea with a northerly course at the northern extreme of the county; the mouth is impeded by a dangerous bar. At Cilgerran and St. Dogmaels are two villages, whose inhabitants support themselves chiefly by fishing. Proceeding along the coast to the westward for about 8 miles, is the town of Newport, once of considerable importance, but now decayed. Six miles farther Fishguard stands on a bay formed by the æstuary of the river Gwain. This bay is about 3 miles across from east to west, with from 30 to 70 feet of water in good holding-ground.

of sand and mud; it is open to the north-west, but is the only port of shelter on the west coast of Wales. In Whitesand Bay there are some remarkable hillocks of blown sand. Off St. David's Head, 51° 54′ N. lat., 5° 17′ W. long., lies a cluster of small islets called the Bishop and his Clerks. The coast here turns to the southward, and shortly after forms the bay of St. Bride, about 9 miles broad and as many in depth; off the southern point of the bay there are several small islands. There are two lighthouses on St. Anne's Head, at the north entrance of Milford Haven. This great estuary, called in Welsh Aber-dau-Gleddau, or the mouth of the two Cleddaus, is about 20 miles in length from St. Anne's Head to the confluence of the East and West Cleddau; the mouth is about 2 miles wide, and it varies from that width to half a mile throughout. It contains numerous bays and creeks, completely landlocked, free from shoals and rocks, with excellent anchorage from 5 fathoms upwards, and forms one of the finest harbours in the world. The southern coast presents a wild and inhospitable appearance; the carboniferous limestone forms precipitous cliffs 150 feet high, without any port before we arrive at Tenby, a town which is situated near the south-east extremity of the county. The coast-line is extremely irregular, but the general bearing from the mouth of the Teivi to St. David's Head is west-south-west, from thence to St. Gowan's Head south-east, and from St. Gowan's Head to the boundary in Carmarthen Bay north-east by east (true). Off St. David's Head lie Ramsey Island and the Bishop and his Clerks; off the southern point of St. Bride's Bay, the islands of Skomer, Skokham, Grasholm; and 15 miles east, the Smalls lighthouse on a rock. Caldy Island lies about 3 miles south from Tenby, and has a lighthouse on it.

Pembrokeshire has no rivers of importance. The two rivers Cleddau or Cleddy are the principal: the eastern branch rises in the Precelli mountains; the western in the north-west part of the county near St. Catherine's, runs by Haverfordwest, from whence it is navigable for small vessels, and, uniting with the East Cleddy about 5 miles below that town, falls into Milford Haven. The other rivers are the Nevern, which empties itself into the bay of Newport, the Gwayn at Fishguard, and the Solva into St. Bride's Bay.

The mail-coach road from London enters Pembrokeshire near Tavernspite. The mail arrives at Hobbs' Point, the station of the Irish steam-packets, at 12h. 34m. A.M., and at Pembroke, 261 miles from London, at 1h. 5m. A.M., quitting that town for London at noon, and Hobbs' Point at 12h. 20m. The principal cross-roads are from St. David's through Fishguard and Newport to Cardigan, 32 miles; St. David's to Haverfordwest, 16 miles; Tenby to Pembroke, 10 miles. There is a railroad from the coal-mines at Kingsmoor to the sea at Saundersfoot.

Climate.—The climate of the southern part of Pembrokeshire is mild, and not subject to great variations of temperature, but the atmosphere is frequently charged with saline exhalations from the Atlantic during south-west winds, and is consequently damp. The higher or northern part of the county has a considerably lower temperature.

Geology.—If a line be drawn through the centre of Pembrokeshire from east to west, we find the stratified rocks north of that line composed of slates, grit, and shales; to the south the older rocks are surmounted by the Silurian rocks, old red-sandstone, carboniferous limestone, and coal-measures. The whole surface is greatly diversified by trap-rocks bursting forth in many places, and altering the structure of the sedimentary deposits. The anthracite, stone-coal, or culm tract bisects the county; it is a continuation of the great basin of South Wales, covering the whole coast of Carmarthen Bay. The northern edge, commencing near Telpyn Point, runs about west by north to the Cleddy opposite Slebech; then, with a westerly direction, by Harroldston St. Issels, where the older Silurian rocks wedge into it, to a quarter of a mile from the sea in St. Bride's Bay; it there widens, and runs north as far as Brawdy. The southern edge, commencing at Tenby, bears the same general direction, crossing the Cleddy at Cherit; the band narrows to three miles south of Haverfordwest, and again spreads out towards St. Bride's Bay. The culm is contained in beds of shale and sandstone, overlying millstone-grit and carboniferous limestone. The seams vary from three feet to a few inches in thickness, and abound in dislocations and contortions. The fossil plants are the same as in other coal-fields, *Neuropteris gigantea*, *Pecopteris cuneifolia*, &c., together with various Lepidodendra and Calamites, which, from their fractured condition, are indeterminable. The millstone grit passes upwards into the coal, and downwards into the carboniferous limestone. It is generally a hard, whitish, siliceous sandstone, intractable for building, but excellent for the roads. The carboniferous limestone dips beneath the millstone-grit, forming a girdle round it in the eastern district, but disappearing in the west; a spur runs off from Carew, and terminates at Pembroke dockyard; another band extends from between Giltar Point and Old-castle Head on the south coast to West Angle Bay at the mouth of Milford Haven, where it is about a quarter of a mile wide. Pembroke stands upon this band. The southern part of the county, from Stackpole on the east to near Castle Martin on the west, is of the same formation, and being bounded on three sides by the sea, presents a greater extent of carboniferous limestone to the view than is anywhere else laid open in Great Britain. The cliffs are about 150 feet high, almost everywhere abrupt, and full of fractures and contortions. There are frequent funnel-shaped cavities and fissures, to which the sea has access. Of these the most remarkable is Bosherston Mere. It is about 100 yards from the sea; and at times, when a heavy surf beats on the shore, reports as loud as artillery are heard from it, while it throws up jets of water forty or fifty feet. There are also many cauldron-shaped hollows, which are filled with trees that could not bear upon the plain surface exposure to the south-west gales. Several species of fossil Spirifera and Terebratulæ are found in the formation. The old red-sandstone enters Pembrokeshire near Tavernspite; throwing out a promontory at Cyffic, it girdles the carboniferous limestone, and tapering away, disappears opposite Slebech. This is the only development of old red-sandstone near the coal-field; all the others are to the south of it, supporting the carboniferous limestone in long ridges. It is generally of a red colour, though there are considerable tracts of grey and yellowish sandstone. No organic remains have been discovered in the Pembrokeshire sandstone. The next in order are the Silurian rocks, comprising all those strata of more antient formation which were included under the names of grauwacke and transition limestone, until classified by R. I. Murchison, Esq. These form a narrow band rising from beneath the old red-sandstone, and contain specimens of Asaphus, Terebratula, Trinucleus, Orthis, Leptæna, &c. Rocks of igneous origin protrude in many places. From Roche Castle near St. Bride's Bay, in a north-east direction, a ridge of trap, called Trefgarn ridge, 673 feet high, runs to Ambleston, and appears again at intervals along the Precelli range. Another ridge from Benton Castle, with an interruption from a narrow band of the upper Silurian rocks, supports the coal-field, is then covered by it, and reappears on the sea-coast in the south part of St. Bride's Bay. Bolton Beacon, 327 feet, the highest ground in south Pembrokeshire, is on this ridge.

The whole of the northern district is composed of rocks of the Cambrian system of Professor Sedgwick, interspersed with occasional protrusions of the igneous rocks. There are no fluvial or lacustrine deposits in Pembrokeshire. Between St. David's and Whitesand Bay, at the bays of Freshwater East and West, and near Stackpole promontory, there are considerable hills of blown sands, extending sometimes more than a mile inland, covering hills at heights of 150 feet above the strand, and containing a prodigious quantity of land-shells, three or four species of Helices and Bulimi. These hills seem to have remained stationary. At Gupton Burrows, Newgale Sands, and St. Bride's Bay are two examples of forests submerged by the ocean, where, after severe storms, the sands being washed away, a stratum of clay and peaty earth appears, through which the stumps of trees are seen in a growing position. Copper-ore has been found in small quantities in the neighbourhood of St. David's, but not sufficient to repay the cost of working. Slate quarries are opened in the Precelli mountains and near St. David's; the quality of the slates is inferior to those of North Wales. Coal is the only mineral besides slate which is worked in Pembrokeshire: it is of that description called anthracite, or stone-coal, the dust or smaller portion of which is known in commerce by the name of culm. The best coal and culm are raised at Landshipping, on the shore of Milford Haven. A considerable quantity of good coal is also raised at Kingsmoor and Kilgetty, from whence it is conveyed by a railway to the sea at Saundersfoot, where a dock has been built.

Soil; Agriculture.—The geological formations of this county presenting great variety, it follows that the soil in different quarters is equally various. On the southern part of the county, the limestone and old red-sandstone formations afford soils of excellent quality: some districts near St. David's, and along the coast towards Fishguard, are considered to be extremely well adapted for the growth of barley; but in the coal district and the slaty ridge of the Precelli mountains, the land is very inferior. The state of agriculture is as various as the soil: in the hundreds of Castle Martin and Roos, and part of Narberth, a better system of husbandry prevails than in the upper or Welsh district, although this is very far from being such as would be approved by a scientific agriculturist. Considerable advance has been made within the last few years, although a general want of capital among the farmers presents a great check to any rapid progress. The breed of black cattle, known by the name of the Castle Martin breed, are bought in droves, for the supply of the London market principally, where they bear a tolerably good character. The breed of horses is much esteemed; they are rather small-sized. Leases for lives were formerly the most usual tenures. The farm buildings, from this reason, were, with the exception of certain properties, small, and in bad condition. The tenants grew crop after crop until the land was exhausted, and the landlord was but an annuitant on his own estate. A better system of leasing tenements now prevails, and few old leases are renewed. The farms vary in size from 30 acres to 800 and 1000, the great proportion being from 100 to 200 acres. The candidates for small farms being far more numerous than for the farms of greater size, the rents of the former are higher in proportion. Farms in the good soils let from 1*l.* to 1*l.* 15*s.* per acre; decreasing to 10*s.*, 7*s.*, and even 3*s.* The cottages are generally built with mud walls, a low thatched roof, a round wattle and daub chimney starting up from the front wall, close by the door. Farm servants are kept in the house. Labourers live in their own cottages. The condition of the poor varies greatly: the poor-rates are very high at St. David's and Wiston, and very low at Tenby.

Divisions.—Pembrokeshire is divided into seven hundreds, viz.:—

Narberth,	to the South-East,	11,942	Inhabitants.
Castle Martin,	South,	5,024	„
Roos,	West,	13,455	„
Dewisland,		10,358	„
Kemys,	North,	14,818	„
Kilgerran,		5,021	„
Dungleddy,	Centre,	7,839	„

There are 148 parishes, of which three are partly in Caermarthenshire, and seven market-towns. Three members are returned to parliament from Pembrokeshire; one for the county, one for Pembroke, and one for the Haverfordwest district of boroughs.

Haverfordwest, the capital town, is situated on the West Cleddy, on the sides and at the bottom of very steep hills. Haverfordwest, with the contributory boroughs of Narberth, Fishguard, and St. David's, returns one member to parliament. The borough contained in 1831, 4139 inhabitants. By the Municipal Corporations Act the council consists of 4 aldermen and 12 councillors. The vicarage of St. Mary's, in the gift of the corporation, has a net income of 131*l.* The rectory of St. Thomas, patron the Prince of Wales, 319*l.* The perpetual curacy of St. Martin's 80*l.* Haverfordwest is principally occupied by shopkeepers, mechanics, and persons of moderate independent fortune, for whom the cheapness of the place is an attraction. House-rent is not low compared with other parts of Pembrokeshire. Wages are low; but a good mechanic earns from 14*s.* to 20*s.* a week. Coals are brought from Newport, Monmouthshire, and Liverpool. The poorer classes use the stone-coal broken small, and made into balls with clay. This fuel gives great heat, but has an unpleasant smell. The streets of Haverfordwest are narrow, ill-paved, steep, and slovenly, but the town contains many excellent residences. The river Cleddy is navigable at spring-tides to Haverfordwest, for vessels of 100 tons burthen; at neaps, for little above 30 tons.

Fishguard, 16 miles from Haverfordwest, and a contributory borough, is increasing though slowly in size, but it is not very flourishing. It contains about 2000 inhabitants. The vicarage, in the patronage of the crown, is worth 111*l.* per annum. In the neighbourhood of the town, meadow-land lets at 4*l.* an acre: in the rest of the parish the average is about 15*s.* There are some farms as large as 300 acres, d some let as low as 5*l.* a year; the tenures are various, for , for terms, and from year to year. Corn and butter are orted; coal, culm, limestone, and shop goods imported. On the 20th February, 1797, a French force of about 1400 men landed here, who, after a few days' rioting and disorder, surrendered to 600 yeomanry and inhabitants hastily armed.

Narberth, contributory to Haverfordwest, and 11 miles distant from that town, on the high road to London, has a population of 2589. It is ill-built and not paved, but is an active, thriving, and increasing place, being the central point of a large district, which is supplied by it with shop goods. Houses are continually building, chiefly 15*l.* or 20*l.* houses, the rents are high, and they are speedily occupied. The average size of farms in the neighbourhood is 30 acres. The rectory of St. Andrew with the curacy of Robeston-Wathen is in the gift of the crown; the net income is 417*l.*

St. David's, a contributory borough, at the extreme west of the county, 1 mile from the sea, 16 miles from Haverfordwest, was once the seat of the bishops, but is now an inconsiderable village, with about 1000 inhabitants. The roads are very bad on all sides. It is inhabited almost exclusively by the clergy who perform the duties of the cathedral, some farmers, and cottagers, a few of which last live by working the peculiar kind of woollen stuff worn by the natives of Sout Wales. The poor-rates are very high, but house-rent so low, that a house which in the neighbourhood of London would let for 150*l.*, cannot let here at 8*l.* The largest farm contains 80 acres. The benefice is a perpetual curacy, of the net value of 110*l.* per annum, in the gift of the chapter. The corporation of the cathedral church consists of six canons, who divide between them an average net income 135*l.*, eight vicars choral, of whom four or five are priests, and a lay vicar, always organist; a treasurer, with an income of 46*l.*; precentor, 86*l.*; chancellor, 30*l.*; and eight prebendaries of whom the net income of the highest is 26*l.*, and the lowest 1*l.*

Pembroke lies in a rich country on a navigable creek of Milford Haven. The town consists of one long street, running east and west, and gradually ascending to the castle which is situated on an abrupt rocky promontory at the west end. Pembroke, with Tenby, Wiston, and Milford returns a member to parliament. By the Municipal Corporations Act, Pembroke is divided into two wards, the corporate body consisting of six aldermen and eighteen councillors. The parliamentary and municipal boundaries are coincident here and at Haverfordwest. The population in 1831 was 6511. The size of the farms in the agricultural part of the borough varies from 50 to 250 acres; there is one farm of 400 acres. Leases are generally for lives. The three parishes of St. Michael, St. Mary, and St. Nicholas, which are united for ecclesiastical purposes, are in the patronage of Sir John Owen: net income 439*l.* In the parish of St. Mary about 2 miles from Pembroke, on the shore of Milford Haven is situated the naval dockyard and arsenal, which was removed hither from Milford in 1814. This is the most important establishment in the county; it occupies about 60 acres of land, and when the improvements contemplated and in progress shall be completed, it will be the finest building-yard in the kingdom, capable of having on the stocks at the same time five or six first-rates, and a considerable number of ships of smaller size. The station of the Waterford steam-packets is at Hobb's Point.

Tenby, a small seaport at the western extreme of Carmarthen Bay, 12 miles from Pembroke, and one of its contributary boroughs, has 1942 inhabitants. There is little trade at Tenby: it is chiefly supported by its merits as a watering-place, for which it is well adapted both by the beauty of its scenery and the protection afforded by the neighbouring headlands. Some of the Plymouth and Brixham fishing boats make Tenby their station during the fishing season. The rectory is in the gift of the Prince of Wales; net income 317*l.*

Milford, 13 miles from Pembroke, over the ferry [illegible] the usual road, which is very bad, and the ferry very expensive—population about 4000—was a highly prosperous town till the removal of the dockyard and packet establishment. The custom-house and quarantine establishments are situated here. Farms in the neighbourhood vary from 25 acres to 250: land near the town lets at 4[illegible] acre; at a distance, about 1*l.*

Wiston, with 745 inhabitants, contributes to the Pembroke district of boroughs: it is 8½ miles direct from Pembroke, [illegible] the road is very circuitous; and 4½ miles from Haverfordwest. The perpetual curacy, in the patronage of the earl of Cawdor, has a net income of 164*l.* There are farms as small as 12 acres, and one as large as 320; they are chiefly let from year to year, one on lease for life, but none for a term.

Mining Industry, Manufactures, and Commerce.—It has been already observed that coal and slate are the only minerals worked in Pembrokeshire. The mines of coal are situated on Milford Haven, and in the parishes of Begelly and St. Issell's, from whence a railway has been constructed to convey the produce to Saundersfoot in Tenby Bay, where a dock has been built.

Pembrokeshire has no manufactures worthy of notice. Some hats are manufactured at Narberth, and the cottagers work the coarse woollen fabric usually worn by the Welsh peasantry. The commerce is very limited; the exports are coal, culm, and agricultural produce; the imports chiefly timber from Canada and shop goods from Bristol. The fisheries on the north coast were formerly valuable, but the fishermen neglect all but the salmon and shell-fish. The fishing-boats of St. Dogmael's are from 7 to 20 tons burthen, with from 5 to 6 men each.

Ecclesiastical Division.—Pembrokeshire is in the province of Canterbury, and the diocese of St. David's, and, with the exception of a few parishes in the northern part of the county belonging to the archdeaconry of Cardigan, in the archdeaconry of Carmarthen. There are 148 parishes, of which three are partly in Carmarthenshire, and 131 benefices, the average net income of which is about 134*l.*, the highest being 439*l.*; there are only three exceeding 300*l.* per annum.

The Crown, as Prince of Wales, appoints .	48
The Bishop	13
Chapter, Corporations, and Universities .	16
Private persons	52
No report from	2—131

Assizes are held in spring and summer at Haverfordwest, and quarter-sessions four times a year at the same place.

Civil History; Antiquities.—Pembrokeshire, which name is derived from *pen*, head or end, and *bro*, an inhabited land, anciently formed part of the territory of the Dimetæ. Giraldus Cambrensis informs us that it was conquered in the reign of Henry I. by Arnulf de Montgomery (brother to the earl of Shrewsbury), who built the first castle of Pembroke of stakes and turf. In the same reign a colony of Flemings settled in that part of the county west of the Cleddy, who still retain their nationality completely distinct, and the district is hence termed "Little England beyond Wales." Richard II. landed in Milford Haven on his return from Ireland, in 1399, at the commencement of the insurrection which preceded his dethronement. Henry Tudor, earl of Richmond, afterwards Henry VII., landed in Milford Haven, August 7, 1485, with about 2000 men, and marched hence towards Shrewsbury, greatly increasing his army by the way, for the Welsh favoured both his cause and family. Pembroke has given the title of earl to several noble families. King Stephen bestowed it upon Gilbert Strongbow, son of Gilbert de Clare; through his granddaughter Isabella it passed into the family of Marshall. Henry III. gave this title to his half-brother William de Valentia or Valence, from whose family it passed by the female line into that of Hastings. The dukes of Bedford and Gloucester, sons of Henry IV., also enjoyed it, as did William de la Pole. Edward IV. created his son earl of Pembroke. Edward VI. created William Herbert earl of Pembroke, which family possesses the title.

Pembrokeshire is rich in antiquities. St. David, soon after the British synod held in 519 for the purpose of suppressing the Pelagian heresy, is said to have built a monastery at Vallis Rosina, situated near Menevia (St. David's), the monks to support themselves by the labour of their own hands. St. David translated the archiepiscopate hither from Caerleon in the sixth century, whence the town took his name. This see was generally full, and enjoyed the archbishopric until 930, when archbishop Sampson carried off the pall with him to Dôle in Normandy. The cathedral, which was built in the thirteenth century, is in the form of a cross, having a square tower, with pinnacles rising from the centre, at the intersection of the north and south transepts. The interior consists of a nave, two side aisles, a choir, and chancel. The nave is separated from the aisles by two rows of columns alternately round and octagonal, five in number, with pilasters at each end supporting circular arches. Over these a range of round pillars support smaller arches reaching to the roof. The ceiling is of Irish oak, in square compartments of elegant workmanship. The length of the nave is 124 feet; the width of the same, 41 feet; aisles, 15 feet. The length of the whole building within, 307 feet. The architecture is Norman mixed with the early pointed order. Some of the arches of the gallery are Norman, but the greater number are Gothic. The architraves are highly ornamented with frets, diagonals, and foliage. The choir is placed immediately under the tower, which is supported by three Gothic and one Norman arch, all springing from Norman pillars. The bishop's throne, at the south-east angle of the choir, is of carved oak, unequalled in beauty save by that of Exeter. A low screen separates the chancel from the choir. The floor of the chancel is of small square variegated tiles. The roof is painted, and enriched with the arms of benefactors. There are 28 stalls carved. In the nave are several monuments of bishops and other dignitaries. Opposite the entrance to the chancel is an altar tomb to Edmund Tudor, earl of Richmond, son of Owen Tudor, by Catherine, widow of Henry V., and father to Henry VII.; also the shrines of St. David, of Rhys ap Gryffydd, prince of Wales, of his son, and of two bishops. The north transept is occupied by a chapel dedicated to St. Andrew. Adjoining the cloisters are the fine remains of the collegiate church of St. Mary's, founded by John of Gaunt, Blanche his wife, and bishop Adam Houghton conjointly. The palace of St. David's, a magnificent ruin, was erected, in 1335, by Bishop Gower; it is built round a court 120 feet square. The bishop's hall, on the south-east side, is 88 feet by 23; the king's, on the south-west side, 58 feet by 30. These two sides alone remain. An open arched parapet in the Gothic style adds greatly to its external beauty.

Pembroke Castle stands on the extremity of an elevated rocky promontory, running from east to west. Giraldus Cambrensis informs us that it was built in the time of Henry I. It is of Norman architecture mixed with early Gothic. The principal tower remains perfect. During the civil wars of Charles I. this castle made a gallant defence for the crown, under Colonels Laugharne and Powell; it was taken and dismantled by Cromwell, in 1648. Under the keep is a spacious natural cavern called the Wogan, about 80 feet by 60. Henry VII. was born in this castle. Manorbeer Castle, near Tenby, is an extensive ruin, whose many remains prove it to have been formerly a place of importance; it was founded by the family of Barri, of which Giraldus Sylvester, surnamed Cambrensis, was a member. He was born here, and the church contains a sepulchral effigy of him. Near St. Gowan's Head is a cell cut in the face of the steep cliff, inaccessible except by a flight of steps. Here St. Gowan lived, and performed miraculous cures. Lame and blind pilgrims are still conveyed hither by their friends, anointed with a poultice of the clay formed by the decomposition of the limestone, and left there to bask in the sun. It is also frequented as a wishing-place; the visitor, if he performs certain ceremonies with due faith in their efficacy, is certain of having his wish fulfilled within the year. At Lamphey, or Llantfydd, near Pembroke, are the remains of a former palace of the bishops, alienated to Henry VIII., and by him granted to Walter Devereux, afterwards Viscount Hereford.

Cilgerran Castle, on the Teivi, was built by Marshall, earl of Strigul (Chepstow), after he had conquered Gryffydd, prince of Wales, in 1223. Near the mouth of the same river are the remains of the monastery of St. Dogmael, founded by Martin of Tours, who conquered the land of Kemmes, in the reign of William I.; it was endowed and made an abbey in the time of Henry I., and dedicated it to St. Mary. The island of Caldy belonged to St. Dogmael's.

Picton Castle, at the confluence of the two Cleddys, was built in the reign of William Rufus. A preceptory of the knights of St. John of Jerusalem was established at Slebech before 1301. Pill Priory was founded by Adam de Rupe, in 1200, of the strict order of Benedictines, called Tyron. At Nevern near Newport there is a curious British cross, formed of a single stone, two feet broad, eighteen inches thick, and thirteen feet high, richly decorated. Near Pentre-Evan, in the same parish, is a cromlech, probably one of the largest in the kingdom. There are several other Druidical remains in the neighbourhood. The church of Nevern is a very venerable pile, and one of the largest in the county. Besides the remains above enumerated are the castles of Carew, Narberth, Haverfordwest, Benton, Llahaden, Newport, Roch, Tenby, castles in Pulslater Bay near Pembroke, the priory and bridge of Haverfordwest, Llanfeth Court, &c.

(Fenton's *Pembrokeshire*; Camden's *Britannia*; Tanner's *Not. Monastica*; Wood's *Rivers of Wales*; Grose's *Antiquities*; Jones's *Views in Wales*; *Rep. Com. Enq. Eccl. Rev. England and Wales*; *Rep. Boundary Com.*, &c.; Murchison's *Silurian System*)

STATISTICS.

Population.—According to the census of 1831, of 18,356 males twenty years of age and upwards, 1599 were labourers engaged in non-agricultural employments; 9781 males aged twenty and upwards were employed in agriculture, of whom 6075 were labourers; 1842 were occupiers of land employing labourers; and 1864 occupiers not employing labourers. The number employed in manufactures or in making manufacturing machinery was 131. There were about 130 weavers of woollen cloth and flannel in the county, but the largest number at any one place was no more than 17, at St. David's. The mines and quarries afforded employment to a considerable number of labourers, and 324 males aged twenty years and upwards were employed as shipwrights and boat-builders.

The population of Pembrokeshire, at each of the four following periods, was:—

	Males.	Females.	Total.	Increase per cent.
1801	25,406	30,874	56,280	..
1811	27,453	33,162	60,615	7
1821	34,530	39,479	74,009	22
1831	37,952	43,473	81,425	9

showing an increase between the first and last periods of 25,145, or rather more than 44½ per cent. on the whole population, being 2½ per cent. above the rate of increase for the whole of Wales.

The following table exhibits a summary of the population of every hundred, &c., as taken in 1831:—

HUNDREDS, BOROUGHS, AND TOWNS.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males, twenty years of age.
Castle-Martin (Hundred) . . .	834	906	6	27	588	179	139	2,372	2,652	5,024	1,200
Dewisland . .	2,109	2,146	11	44	1,443	334	369	4,797	5,561	10,358	2,344
Dungleddy . .	1,528	1,609	13	47	875	411	323	3,715	4,120	7,835	1,627
Kemess . . .	3,136	3,244	41	120	1,815	684	745	6,762	8,036	14,798	3,254
Kilgerran . .	973	990	8	18	596	228	166	2,333	2,688	5,021	1,121
Narberth . .	2,343	2,406	9	46	1,102	557	747	5,765	6,177	11,942	2,7[illegible]
Roose . . .	2,667	2,773	20	96	1,382	612	779	6,516	7,377	13,893	3,0[illegible]
Haverfordwest (Town)	748	809	15	24	10	513	286	1,737	2,178	3,915	875
Pembroke (Borough)	1,079	1,233	34	29	131	646	456	3,084	3,427	6,511	1,4[illegible]
Tenby (Town) . .	362	479	7	23	32	355	92	871	1,257	2,128	44[illegible]
Totals .	15,779	16,595	164	474	7,974	4,519	4,102	37,592	43,473	81,425	18,356

County Expenses, Crime, &c.—The sums expended for the relief of the poor, at the following dates, were—

	£.		s.	d.	
In 1811	20,390,	being	6	8	for each inhabitant.
In 1821	20,245	„	5	5	„
In 1831	24,552	„	6	0	„

The expenditure in each of the following years was as under:—

1834.	1835.	1836.	1837.	1838.
£.	£.	£.	£.	£.
25,593	23,119	22,580	21,833	21,576

In 1837-8 the amount for each head of the population, according to the census of 1831, was 5*s.* 4*d.*; but assuming that the population had increased 7 per cent. from 1831 to 1838, the average for each inhabitant, instead of being 5*s.* 4*d.*, will be 4*s.* 11½*d.*

The sum raised in this county for poor-rate, county-rate, and other local purposes, in 1833, was 30,616*l.*, levied upon the following descriptions of property:—

On land . .	£27,072
Dwelling-houses .	3,284
Mills, factories, &c. .	166
Manorial profits, navigation, &c.	93
Total	£30,616

Under the property tax Pembrokeshire was assessed, in 1815, at 220,291*l.*, namely, property from lands 181,057*l.*, houses 20,096*l.*, tithes 15,395*l.*, profit from manors 38*l.*, profits of quarries 603*l.*, profits of mines 3102*l.* The annual profits of trade were assessed at 43,102*l.*

The county expenditure for the year ending 25th March, 1838, amounted to 26,676*l.*, namely—

Relief and maintenance of the poor .	£21,576
Removal of paupers, law charges . .	527
Payment towards county-rate . .	3,306
Fees to clergymen and registrars under Registration Act	128
Outlay for register-offices, books, &c., under ditto	93
Payments under Parochial Assessments Act	68
For all other purposes	958
Total .	£26,676

There are three unions in Pembrokeshire, under the Poor Law Amendment Act, namely—

	No. of Parishes.	Population, 1831.	Expended for Relief of P[illegible] Before the Union.	Year end. 25th M[illegible] 18[illegible]
Haverfordwest	63	33,533	11,221*l.*	91[illegible]
Narberth .	51	21,902	5686	52[illegible]
Pembroke .	21	17,191	5842	56[illegible]

In 1835-6 the number of bastard children chargeable to the poor-rate in the county was 863, or one in 94 of the population, according to the census of 1831; the average for Wales being one in 139, and for England one in 215. At the same period 95 lunatics and idiots were chargeable to the poor-rate, or one in 857 of the population; the proportion for Wales being one in 807, and for England one in 1033.

The number of turnpike-trusts in the county in 1836 was four, having 173 miles of road under their charge. The income from tolls in 1835 was 1605*l.*, and the total income amounted to 2903*l.*, including 1008*l.*, borrowed on security of the tolls. The expenditure amounted to 32[illegible]*l.* The debts of the trustees were 19,273*l.*, consisting of 15,[illegible] bonded or mortgage debts; 3654*l.*, unpaid interest, and the remainder of the balance of small sums due to the treasurers.

The number of persons charged with criminal offences and committed, in the three septennial periods ending with 1820, 1827, and 1834, were 179, 150, and 178, making an average of 25 annually in the first period, 21 in the second, and 25 in the third. In each of the following years the numbers committed, convicted, and acquitted were respectively as follows:—

	1835.	1836.	1837.	[illegible]
Committed .	38	67	54	[illegible]
Convicted .	20	35	28	[illegible]
Acquitted .	18	32	26	[illegible]

Of the 46 persons committed in 1838 the number of ma[illegible] was 26, females 20; and 16 of the former and [illegible] of the latter were between 21 and 30 years of age; only [illegible] females, were under 16. There were 10 of the males [illegible] females who could neither read nor write; 13 males [illegible] females could read and write imperfectly; 3 males could read and write well; and the state of instruction of the remaining 3 was not ascertained. None of the alleged offences were of a heinous nature; 6 were offences against the person, 7 offences against property attended with violence, 27 offences against property unaccompanied by violence, 23 being cases of simple larceny, and the remaining 6 were other offences of a light character. Of the 20 persons convicted, 17 were imprisoned for various periods of six months and under; 2 for above six months and under one year; and 1 was transported for 15 years. Of the 26 acquitted, 17 were found not guilty on trial; in the case of 8 no bill was found; and in one case there was no prosecution.

The number of persons registered to vote for the county members, in 1834-5, was 3664; in 1835-6 there was an increase of 202, the number of persons qualified being 3866. In 1835 there were 1296 persons in the county qualified to serve on juries under 6 Geo. IV., c. 50.

There are only two savings'-banks in the county. The number of depositors and amount of deposits in each of the following years was as under:—

	1835.	1836.	1837.
Number of depositors .	1230	1362	1417
Amount of deposits .	41,827*l.*	45,107*l.*	48,047*l.*

Education.—According to the Charity Reports, the income of endowed schools in the county is 412*l.*, and the sum of 38*l.* is applicable to purposes of education in schools not endowed. The following summary is taken from the third volume of the Education Inquiry made in 1833 on the motion of the late Earl of Kerry:—

	Schools.	Scholars.	Total.
Infant schools	8		
Number of children at such schools; ages from 2 to 7 years:—			
Males . .		38	
Females . .		56	
Sex not specified .		131	
			225
Daily schools	193		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		1,874	
Females . .		1,387	
Sex not specified .		2,832	
			6,093
Schools . . .	201		
Total of children under daily instruction			6,318
Sunday-schools	145		
Number of children at such schools; ages from 4 to 15 years:—			
Males . .		2,693	
Females . .		2,584	
Sex not specified .		5,859	
			11,136

Eighteen Sunday-schools are returned from places where no other school exists, and the children who are instructed therein (1229 in number) cannot be supposed to attend any other school: at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, does not appear. Twelve schools, containing 719 children, which are both daily and Sunday-schools, are returned from various places, and duplicate entry is therefore known to have been thus far created. In some of the Sunday-schools, adults and aged persons as well as children attend; and two Sunday-schools are mentioned where some are said to attend at eighty years of age.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	—	—	—	—	7	214	1	11
Daily Schools	19	683	10	719	155	4,152	9	539
Sunday Schools	4	185	133	10,400	4	262	4	290
Total.....	23	868	143	11,119	166	4,627	14	840

The schools established by Dissenters, included in the above statement, are—

			Scholars.
Infant-schools .	2, containing		27
Daily-schools .	10	.	362
Sunday-schools .	91	.	7,736

The schools established since 1818 are—

Infant and other daily schools	104, containing		2,227
Sunday-schools .	115	.	9,241

Seven boarding-schools are included in the number of daily schools given above. All religious denominations, including the Established Church, disclaim the fact of education being confined in any of the schools in the county to children whose parents are members of their respective denominations.

Lending libraries of books are attached to 4 schools in this county.

PE'MPHIGUS is a disease of the skin, consisting of the eruption of one or more rather large blisters, containing serous fluid, and terminating either in thin scales, in superficial excoriations, or in ulceration. The common and most acute form of Pemphigus is usually preceded by shivering, and accompanied by slight feverishness; the eruption appears on some part of the body from one to four days after the beginning of the illness, with a pricking sensation and bright redness of the part affected. Within 24 hours afterwards the blisters begin to rise, and increase in size till they are most frequently as large as nuts, but often much larger, and sometimes smaller. They then, after two or three days, burst, and leave the skin raw and painful. A thin scab usually forms over the exposed skin, and after a few days more, drops off and leaves it healthy, but redder, and with a thinner cuticle than natural. The treatment should consist of gentle purgatives, and cooling medicines and diet; the local applications, if any, should be mild dressings, merely for the purpose of defending the raw surfaces from the air and injury. The disease will thus usually run its course to natural recovery.

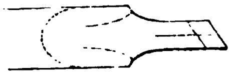
A more obstinate form is the chronic pemphigus, which occurs in old or very debilitated persons. The blisters appear one after the other, through an indefinite length of time, some breaking out while others are healing or ulcerating or even sloughing. They are so commonly the accompaniments of other more serious disorders, that the local affections of the skin in these cases are seldom the objects of peculiar treatment; if the condition of debility on which they are grafted can be relieved, they also will soon disappear.

A third form is that termed infantile or gangrenous pemphigus. It is entirely confined to children and especially affects those who are less than five years old. It occurs sometimes as an epidemic, and is very common among the children of the poor in Ireland, where it is known under the name of white blisters, burnt-holes, eating-hive, &c. The blisters in this form are usually succeeded by deep ulcers, which enlarge rapidly and discharge profusely, and have dark livid edges and a remarkable smell. The child at the same time becomes emaciated and weak, and often about the eighth day of the disease sinks into a state of debility which soon terminates fatally. All the usual modes of treatment being found useless, Dr. Stokes, by whom this form of the disease has been particularly described, sought out a remedy which had been commonly used with success by an empiric, and found it to be the juice of the great figwort (*Scrophularia nodosa*), which was made up into an ointment. He has since used it with considerable success. The swollen and ulcerating parts having been previously poulticed, the ointment should be melted, and applied over them very gently with a soft feather. This ointment is prepared by stirring the young leaves of the Scrophularia in a small quantity of unsalted butter till it acquires a full grass-green colour. It is of considerable utility in many diseases of the skin besides that for which it was first employed. In pemphigus its use should be combined with nutritious diet and tonics.

PEN. This simple but useful little instrument was formerly made of reed, but the quill has been used in this country for that purpose for about five hundred years.

Of the common method of making pens by hand it is not necessary to speak; we shall therefore only say a few words upon the manufacture of 'quill nibs.' The barrel of the quill in the first place has both ends cut off, and is divided down the centre; the halves are then laid on their convex side and the edges shaved smooth; after this they are divided into three or four lengths each, and the end of each length is made into a pen by a small machine, which at one stroke makes the slit and cuts the shoulders; they are then finished by being nibbed by hand. Small pocket machines may be bought at the cutler's for making pens on the same principle as that used in the manufacture of the nibs; but they are expensive, and require careful usage, or they soon get out of order.

The pen used for German text, old English, ingrossing, and other black hands, as they are called, is not generally known. It differs in make, but still more in application, from that employed for ordinary writing. The nib is made as broad as the thick or down stroke of the writing is intended to be, and in using it no pressure is required to open the nibs, as in making a thick stroke by the common pen. The only use of the slit is to give greater elasticity to the point, and to form a channel for the ink. For very large writing two other slits are sometimes made, one in each shoulder; a pen made in this manner works more freely, and does not tire the hand so much as if made with one slit only. The fine or up strokes are produced by throwing the pen to one of the angles of its nib, generally that to the left of the hand in writing, by a turn of the wrist, and a practised hand can produce in this manner the finest hair-stroke. These pens are made of the turkey quill, the goose quill being too weak for the purpose. In making the slit, in all quills, but more particularly in these, it is necessary that they should be well scraped, as the upper surface, being formed of fibres lying in rings around the quill, will otherwise cause the slit to be ragged. The shoulders of these engrossing pens should be well hollowed out, so that they may be nibbed several times without the necessity of mending the other parts of the pen. In nibbing them, a sloping cut, or false nib, must first be made, to reduce the substance of the quill, which would, if this were not done, be clumsy, and deliver the ink too fast. This remark applies also to the common quill, though in a smaller degree. The real nib must then be made perpendicular to the quill, and the knife held in such a manner as to take more off the right than the left side, as seen in the annexed figure, which represents the back of a pen fit for writing German-text letters an inch long. The object in sloping the nib is to render the pen more convenient for describing curves, &c., for by holding the elbow rather away from the side, as in drawing, the nib may be more easily brought to an angle of about 45 degrees with the line of writing, so as to be equally applicable to the horizontal and perpendicular position of the different parts of the letters. On account of this angular position of the nib, it is necessary to make it rather wider than the thick stroke of the writing.



Many attempts have been made to substitute steel or other pens for the turkey quill, which is short and of small diameter, but hitherto without success.

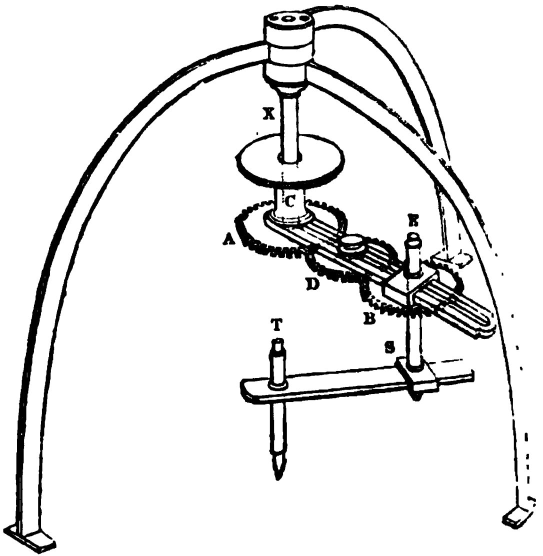
Steel Pens.—Owing to the constant necessity for mending quill pens, the loss of time consequent thereon, and the inequality of the writing, an immense amount of labour and ingenuity has been employed to produce some more durable substitute. The only substitute however which has attained to anything like general use is the steel pen. These pens are manufactured to an amount in quantity, and at a cost so small, as hardly to be credible. Different makers have different modes of operation, but the following will give a general idea of the method employed. In the first place flat pieces of steel are cut out, of the shape required, by a stamping-press; they are then placed under another press, which pierces the holes and cuts the slits; and they are struck into their convex shape by a third press. They are then polished and tempered. The polishing is managed in rather a curious manner; a quantity of pens are shut up in an iron cylinder, leaving a considerable space unoccupied; this cylinder is attached at each end to a crank, the axes of which are connected by a wheel and set in motion by a handle or by machinery. Thus by being rubbed against each other the pens come out well polished, and with all the burrs or sharp angles left by the cutting-presses rubbed smooth. Sometimes the steel of which these pens are made is alloyed with silver, platinum, rhodium, or other metals, which improves the elasticity, and in some cases prevents rust; but this alloy considerably increases the expense, and in the case of rhodium to an amount almost sufficient to prevent its use.

Ruby Pens.—Pens made of gold with a small ruby at each nib seem to be perfect, some having been used, to our knowledge, for years without needing to be repaired, but the price is so high as to prevent the possibility of their coming into general use.

Fountain Pen—is a pen made with a reservoir in its stem or holder, to supply ink for some time without replenishing. The nib is in most cases supplied by a small valve, which may be closed when not in use.

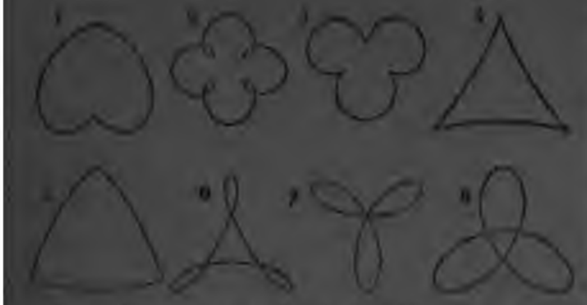
Music Pens.—There are two pens used for the purpose of writing music; the one to rule the lines, and the other to make the dots. The former is a piece of brass with five prongs or points, in each of which is a channel for the ink, which is supplied from a small cup in the solid part of the pen just above the division of the points. The latter is a mere tube with a hole in its side for supplying it with ink, and a small wire or piston fitted within it. The ink flows between the wire and its case, and the dot is made by placing the pen upon the spot, and pressing the wire down upon the paper.

Geometric Pen. This is an instrument invented by Suardi, an Italian, for drawing geometric curves. These curves may by combination be made to form an almost infinite variety of patterns. It is supported, as shown in the diagram, on three legs bowed so as to allow room for the instrument to work within them. These legs shut together by the joint at the top for the convenience of package. Attached to the joint is a stem or axis X, upon the lower end of which is fixed the toothed wheel A; this stem, with its wheel, is stationary, and all the other parts of the instrument move round it. Just above the wheel A is a small tube or cannon, to which is attached an arm carrying two boxes and spindles for supporting the wheels D B; the spindle E is continued downwards, and terminates in a socket S, through which passes an arm carrying the pencil or tracer T. The two wheel boxes D B on the one arm, and the socket S on the other, may be fixed at any part of their respective arms by means of screws for that purpose; fixed to the tube C is a small circular plate of metal with a milled edge, by which the instrument is moved around its axis by the thumb and finger.



The sort of curves produced by this instrument depends upon three circumstances: first, the relative size of the wheels A and B; second, whether the wheel D is employed or not, or in other words, whether the two arms move in directions contrary or similar to each other (this wheel has no effect otherwise, and may be of any convenient size); and third, on the relative distance of the tracer T from the spindle E, and of that spindle from the axis X, which may be expressed as the relative distance of T E and E X.

The following diagram gives an idea of a few of the most simple curves. The number of parts or leaves in each figure depends on the first of the three circumstances above mentioned: for *fig.* 1 the wheels A and B must be equal; for *fig.* 2, as 4 to 1; and for the rest, as 3 to 1. On the second circumstance depends whether the loops or parts



lie within the curve, as in *figs.* 1, 2, and 3; or on the outer side, as in the others; and lastly, upon the third circumstance depends the shape of the points or loops themselves. For the eight curves given above, T E must be less than E X, but if this is reversed, the curves assume a most curious, complicated, and sometimes beautiful arrangement.

Suardi states that 1273 curves may be produced by the changes of twelve wheels, the smallest having eight, the next sixteen, and so on to ninety-six teeth, and that by the addition of a few pieces, spirals with a circular base, and particularly the spiral of Archimedes, may be produced.

For further information the reader is referred to Suardi's work, entitled 'Nuovo Istromento per la Descrizione di diverse Curve Antichi e Moderne,' &c.; and to Adams's *Geometric Essays.*

PENÆUS. [Shrimps.]

PENALTY, in its original and proper sense, is a pecuniary punishment imposed by statute upon parties guilty of certain offences. This term is also used to denote a sum of money which a party to a contract has engaged to pay in case he violates his engagement. Penalties imposed by statute are strictly regulated by statute; but with respect to penalties created by contract, the rule is neither so strict nor so uniform. In one class of cases the courts of common law have the power of awarding damages commensurate to the injury sustained, though the parties have agreed that a fixed sum shall be paid by way of penalty. In a second class, the courts of common law possess this power of limiting the sum to be recovered by action to the amount of injury sustained, only where the plaintiff, by bringing an action of assumpsit or of covenant instead of an action of debt, abandons his claim to the penalty. In a third class, the actual amount of injury is capable of being ascertained, but the courts of common law are, from the form of the proceedings, absolutely bound by the contract of the parties. Here the courts of equity interpose to relieve the party from the rigorous exaction of the penalty. (Comyns's *Digest, Chancery* (2 Q 3—4 D 2.) In a fourth class, although the sum stipulated to be paid upon the doing or the omission of a particular act may be obviously disproportioned to the amount of injury sustained, yet if there be no means of ascertaining the amount, or if it be expressed in the contract that the sum to be paid shall be regarded not as a penalty, but as liquidated damages, that is, as the sum ascertained and agreed between the parties as the pecuniary amount of the injury, neither courts of law nor courts of equity can prevent the recovery of the stipulated sum. Where however a large sum is stipulated to be paid in the event of the non-payment of smaller sums at a particular time, no agreement between the parties can so far alter the real nature of the transaction as to convert this sum into liquidated damages. In other cases the distinction between a penalty and liquidated damages is often difficult to ascertain, and some of the decisions on this head are not easily reconciled.

The third class of cases, those in which the interference of a court of equity is necessary, is much narrowed by the statute 8 & 9 Will. III. c. 11, s. 8, under which, in actions in courts of record upon any bond or penal sum for the performance of covenants or agreements contained in any indenture, deed, or writing, the plaintiff is required to state the breaches of covenant or agreement which he has sustained, and damages are to be assessed accordingly. If the plaintiff recover in the action, judgment is entered up for the penalty, but execution issues only for the damages assessed by the jury upon the breaches stated and proved, the judgment remaining as a security against future breaches of the same covenant or agreement, or of other covenants or agreements contained in the same instrument and protected by the same penalty. [Bond; Damages.]

It was formerly usual to insert in leases a stipulation that if the rent were not paid on the day on which it became due, a small sum should be added for every day during which it remained unpaid. This graduated penalty is called a *nomine poenae*, and the landlord may distrain [Distress] for it. A *nomine poenae* is seldom found in modern leases, the interest of the landlord being considered sufficiently protected by a clause usually inserted, enabling the landlord to make the lease void in case of non-payment of rent or breach of other covenants.

PENANCE (in Latin, *Poenitentia*) is a censure or punishment, enjoined by the ecclesiastical law, for the purgation or correction of the soul of an offender, in consequence of some crime of spiritual cognizance committed by him. Thus a person convicted of adultery or incest was adjudged to do penance in the church or market, bare-legged and bare-headed, in a white sheet; and was required to make a public confession of his crime, and to express his contrition in a prescribed form of words. After a judgment of penance has been pronounced, the ecclesiastical courts may, upon application by the party, take off the penance, and exchange the spiritual censure for a sum of money to be paid and applied to pious uses. This exchange is called a commutation for penance; and the money agreed or enjoined to be paid upon such a commutation may be sued for in the ecclesiastical court.

The peine forte et dure imposed upon a person who stands mute on his trial at the common law is often inaccurately termed penance. [Peine Forte et Dure.]

PENANG, PULO (or Island of Penang), is the seat of government of the British possessions in the Strait of Malacca. These possessions consist of the Island of Penang, province Wellesley, the provinces of Tenasserim, Malacca, and Singapore. The three latter are noticed under separate heads.

The Island of Penang, also called Prince of Wales' Island, lies between 5° 15′ and 5° 30′ N. lat., and between 100° and 100° 5′ E. long., and extends from south to north about 16 miles, with an average breadth of eight miles, which gives a surface of nearly 130 square miles. This island consists of a mass of rocks, which occupy about two-thirds of the surface, and of two tracts of alluvial soil, which extend on the eastern and western side of the rocks. The western plain is mostly a swamp, and nearly uninhabited; but the eastern, which on an average is two miles wide, and opposite George Town more than four, is at present well cultivated and populous. The highest portion of the mountains occupies the middle of the island; where Mount Elvira, or Mount Macalister, rises to the elevation of 2560 feet, according to an estimate. Farther north is Flagstaff Hill, which is 2248 feet high, according to measurement. The hills which lie between this highest range and the eastern plain rise to the elevation of 600 to 800 feet. The mountains are covered with lofty trees, except their summits, which are naked for about 200 or 300 feet from the highest point downwards. Along the sea are swampy tracts covered with mangroves, and contiguous to them mud banks which frequently change their position and extent. From the belt of mangroves the country extends in gentle undulations to the foot of the hills, and has an indifferent soil, except where it is interrupted by deeper depressions containing an alluvial soil which yields good crops of rice. The narrow valleys which extend into the mountains have their slopes covered with a tolerably fertile but varying soil.

The province Wellesley lies opposite Pulo Penang on the Malay Peninsula, and is separated from the island by a strait, which at its southern extremity is nearly 10 miles wide, but grows narrower farther northward; opposite Fort Cornwallis it is hardly two miles wide. Province Wellesley extends from 5° 10′ to 5° 35′ N. lat., and lies between 100° 11′ and 100° 19′ E. long. It extends along the coast about 30 miles, and from 4 to 10 miles inland. On the east it borders on the kingdom of Keddah, or Queda, which is dependent on Siam, and the boundary on this line was regulated in 1831. The northern boundary-line is formed by the river Muda, which separates it from Keddah, and on the south it is separated by the river Krian from the state of Perak. The area is estimated at 160 square miles. The mountain-ranges, which in this part extend over the greatest part of the Malay Peninsula [Malay Peninsula], do not approach so near the sea as to enter the province, except near the river Juru (5° 20′ N. lat.), where one of their offsets terminates in the Mormajam, a hill 1569 feet high, the western slope of which lies within the English territory. The coast-line exhibits a narrow sandy belt of low land in the northern districts, and in the southern a broad mud flat covered with mangrove-trees and flooded at high-water. Behind the sandy belt and mangroves there are extensive alluvial tracts under rice cultivation, alternating with gentle swells of light soil running parallel to the coast. About four or five miles from the coast there are dry alluvial plains which stretch south and north. A few hills of moderate elevation are scattered over these plains. The soil of the alluvial plains and rice-grounds is superior in fertility to lands of the same classes on Penang, but that of the hills is much the same.

Rivers.—There are no permanent streams in the island of Penang, but several rivers traverse Wellesley province from east to west, rising in the elevated mountains in the state of Keddah. These rivers, enumerated from north to south, are Muda, Pry, Juru, and Krean. All these rivers have bars at their mouths, generally with seven to nine feet water on them: that of Pry river may be crossed at flood-tide by vessels of 300 tons burden at least. All these rivers are navigable for moderate sized vessels nearly the whole length of their course within the province. Between Muda and Pry rivers is the mouth of a creek, called Qualla Tulloh, which forms a good harbour for boats; and near it is an extensive village of the same name.

Climate.—The dry and wet seasons in these countries are not so distinctly marked as in other parts of the East Indies. What is properly called the rainy season is limited to three months, from September to November, but showers, and frequently heavy showers, occur in all the other months. Thus rain fell almost every day between October, 1789, and June, 1790; and between May, 1833, and April, 1834, both included, it rained 145 days on Penang plains, 166 days on the Flagstaff Hill, and 228 days in Province Wellesley. Droughts of considerable duration occur at intervals of four or five years, and still longer droughts at longer intervals. The quantity of rain from May, 1833, to April, 1834, both included, on Flagstaff Hill was 116·6 inches, on Penang plains 65·5 inches, and in province Wellesley 79 inches. The heat is not oppressive, and is greatest in June and July. A hot wind is not known within the straits. The highest temperature in George Town is 90° and the lowest 70½° Fahr. The mean annual temperature on Penang Hill is 71°, on the plain 79⅔°, of the mornings 75⅔°, from mid-day to 4 o'clock 83⅔°, of the evenings after sun-set 80°. The average monthly range of the thermometer is 11° and the greatest monthly range only 13°. The northern half of Wellesley province has the more healthy climate, as it enjoys the advantages of a regular change of sea and land breezes. The rainy season is considered the spring, and January, February, and March as the autumn; in the former period the rice is sown, and in the latter it is harvested.

Productions.—Penang derives its importance partly from the cultivation of spices. Pepper has for many years been the object of an extensive cultivation, but the low prices of this article have of late years checked this branch of agriculture. Previous to 1807 the average annual quantity was nearly four millions of pounds, but it decreased rapidly, and at present it does not exceed 2000 peculs, or 856,000 pounds weight. It has been replaced by the cultivation of clove and nutmeg trees. Several attempts have been made by the French and English to transplant these trees from the Moluccas to several parts of America, Africa, and India, but none of these attempts seem to have been completely successful, except those made at Bencoolen on Sumatra and on the Island of Penang, and this branch of agriculture is rapidly increasing. Captain Low in 1835 estimated the number of nutmeg-trees in 30 plantations, at 80,000, and he says that about 45,000 of them were bearing, and their annual produce was 130,000lbs.; the number of clove-trees is still greater, and increasing. The mace and cloves grown in Penang are considered the finest in the world, and preferable to those imported from Banda and Amboyna, the mace being more substantial and flaky, and the cloves more full and richer in colour. The nutmegs also are thought not to be inferior. Since palm-oil has been extensively used in the manufacture of candles in England, the plantations of cocoa-nut trees have greatly increased, and oil is made by the Chinese settlers in the country to a great extent; the nuts themselves are exported to Singapore, the Tenasserim coast, and Rangoon. The sugar-cane is partially cultivated on Penang, but extensively in Province Wellesley, especially in the central and southern districts, where the sugar plantations occupy about 900 acres of land; they are in the hands of the Chinese settlers. These people also cultivate three different plants, from which they make indigo, but the product is too crude for the European market. The leaves of a plant, called *nilam* by the Malays, are occasionally exported in considerable quantities by Arab traders, who use them as stuffing for mattresses and pillows; in Siam they are used for making perfumery. Tobacco, coffee, and cotton are only raised for consumption. A considerable quantity of betel is exported to the neighbouring state of Keddah. The areca-nut, whence the island derives its name (Areca-nut Island), is not much attended to at present, though its cultivation constituted the chief occupation of the Malays, who first occupied the island. All the areca raised on the east coast of Sumatra is brought to Penang, and hence exported to other parts of Asia.

Rice and Indian corn are the only kinds of grain cultivated. Rice-land in Penang yields on an average about 75 fold, but in Wellesley Province more than 100 fold. As Indian corn is considered by the Malays far inferior to rice as food, its cultivation is not extensive. The plantains and bananas are, next to rice, the principal objects of agriculture, and in times of scarcity supply in some measure the place of grain. Eight varieties are raised.

No country on the surface of the globe possesses a greater variety of fruit-trees than the Malay Peninsula and the Indian Archipelago. The fruit-trees which are cultivated are the mangosteen, durian, jack-tree, champadah, a species of jack, rambei, rambutan, the Siam mango, the egg mango, machang, jamboo kling and jamboo ayer mawah, num num (cynometra cauliflora), lime, custard-apple, mulberry, pine-apple, the grape, and orange. Many other fruit-trees are found in a wild state in the forests on the declivities of Mount Moratajam, and their fruits are brought to the coast. Capt. Low mentions twenty-three different kinds of fruit brought from the skirts of Mount Moratajam to Penang.

The same author gives a list of 128 different kinds of trees met with in the forests of the country, and applicable to building and other domestic uses. Boat-building is a favourite occupation with the Malays, and they build good boats. Oil is extracted from the fruits of several trees, both for burning and for culinary purposes. The bark of other trees is used for tanning leather and for fish-lines. The India-rubber tree grows along the western boundary of Province Wellesley. Dammer, or the resin of the dammer-tree, is collected and used for paying vessels. Minyak dammer, or wood-oil, is the sap of another tree, and employed in careening ships. There are also twenty-two species of ratans, one of which produces dragon's blood; and twenty different kinds of bamboos, which are used for domestic purposes. The wood or bark of some other trees is used in dyeing. A kind of cardamum is collected in the forests beyond the eastern frontier, and exported by the Chinese.

Besides the native vegetables, which are numerous, the Chinese cultivate cabbages, celery, and lettuce. Peas and carrots thrive well, but potatoes have not succeeded. There are however many varieties of sweet potato, one of which is much esteemed. Yams, both red and white, and French beans, are extensively grown.

Buffaloes and cattle are rather numerous. The cattle are reared for the dairy, the cattle for slaughter being chiefly imported from Keddah and Patani. The black buffalo is most prized, both for draft and slaughter. The annual consumption of cattle on Penang and by the shipping is about 300 head. About 400 buffaloes are slaughtered yearly. Goats and sheep do not abound, but a great number of hogs are reared by the Chinese. Poultry is plentiful, especially in Province Wellesley, whence upwards of 120,000 are annually sent to Penang. A great number of ducks are reared, and their salted eggs form an article of provision for native prahms and Chinese junks.

Wild animals of the larger size are found in Wellesley Province, as the elephant, rhinoceros, and tiger. The elephants are sometimes exported to Madras, and used in the neighbouring states to carry the tin from the mines to the coast. They are also killed by the Malays for the sake of the ivory. The rhinoceros is killed for its horn and hide. There are two species of wild ox, and abundance of wild hogs and deer, especially in the forests of the province, where also the plandok, a hornless deer about the size of a hare, occurs in great numbers. There are also several kinds of monkeys.

Birds are found in great variety, and many of them have great beauty. The catching and preserving of the skins with the feathers on, of the larger kinds of kingfishers, is a lucrative employment of the natives. These skins are exported to China, where they are used for embroidering dresses. The other birds most distinguished by the beauty of their feathers are, the pagar, which has a brownish crimson plumage, and is rather larger than a moor-fowl; the large kwang, or Argus pheasant, and the smaller sort, which has its back spangled with eyes; and the murragh, or the peacock, which has a magnificent plumage of a light golden hue.

Penang is cheaply and plentifully supplied with fish. Besides the porpoise and skate, Low has enumerated fourteen species of fish which are considered as poisonous or unwholesome, and fifty others which are eaten. A small species of whale frequents the strait between Penang and the province at intervals. Fishing-stakes afford nearly exclusive employment to numbers of Chinese and Malays. There are eighteen species of crabs, oysters, and other shell-fish. A species of sea-turtle, the hog-billed, is frequent in some places, and another smaller kind in the rivers: the eggs of both species are eagerly sought after

Gold, which is found in nearly all the states of the Malay Peninsula, does not occur within Wellesley Province. Tin was some years ago discovered to exist in some places, but in too small a quantity to be worked.

Inhabitants and Population.—When the English took possession of Penang Island (1786), they found only a few Malay families, mostly fishermen; but natives from the neighbouring countries, as well as Chinese, and Chuliahs from Hindustan, soon flocked to it, and the population, in 1835, consisted of ten different nations.

Population of the Island of Penang.

Fixed:—	
Europeans and their descendents	790
Armenians . . .	21
Malays	16,435
Achinese (Sumatra) . .	350
Battas (Sumatra) . .	561
Chinese . . .	8,751
Chuliahs . . .	7,886
Bengalese . . .	1,322
Siamese and Burmans . .	648
Arabs . . .	142
Parsees . . .	50
Native Christians . .	708
Caffres . . .	180
	37,844
Fluctuating:—	
Native military and followers, averaged at . . .	700
Convicts (from Hindustan) .	1,263
Itinerants . . .	400
	2,363
Total .	40,207

When the British acquired the coast-line called Wellesley Province, it was very thinly inhabited; and though the population gradually increased, it did not exceed 5000 inhabitants in 1821. But in this year the raja of Ligor invaded the neighbouring state of Keddah, and took possession of it for the king of Siam. Upon this a great part of the Malay population abandoned Keddah, put themselves under the protection of the British, and settled in Wellesley Province. In 1835 the population of this country consisted of—

Malays . . .	42,500
Chinese . .	2,252
Chuliahs . .	549
Bengalese . .	579
Siamese . .	500
Fluctuating . .	500
	46,880

Thus the population of this province has doubled ninefold in fifteen years. It contains 293 persons on a square mile, and the island 310 persons.

George Town is built on the eastern side of the Island of Penang, where it projects into the strait, and contains a population of 20,000, mostly Chinese. It is the seat of the governor of the British possession on the Strait of Malacca, and carries on a considerable commerce. The harbour, which lies on the south-east of the town, is well sheltered, and may be entered by any kind of vessels from the north; but vessels drawing more than 18 feet of water cannot sail through the strait southward. It is visited by most of the vessels sailing from Hindustan to China, and likewise by vessels from China, Arabia, and Siam. There are sometimes 300 vessels in the harbour. Since the foundation of Singapore, it has ceased to receive the commercial productions of the Indian Archipelago and the southern countries of the Malay Peninsula; but it is still the principal place to which the inhabitants of the eastern coast of Sumatra and the countries north of Malacca bring their goods. These goods consist of pepper, benzoin, camphor, gold-dust, areca-nuts, rice, ratans, sago, brimstone, tin, arrack, sugar, oil, tobacco, birds'-nests, trepang, and ivory. In 1825 the value of the exports of this place was estimated to amount to nearly 1,000,000*l.*, and probably it is not less at present. It exports to the eastern coast of Sumatra and the Malay countries north of Malacca, various kinds of piece-goods from England, Bengal, and Coromandel; cotton, opium, iron, steel; European coarse blue, red, and green cloth, and coarse cutlery. James Town is a small but thriving place, about a mile from the sea on the eastern plain of Penang Island, in a very fertile district. There are no towns in Wellesley Province; but in the northern more fertile and better cultivated districts, in some places, the higher parts of the low ridges are covered by continual rows of houses for several miles. The most extensive of these villages is Pinaga.

History.—Before 1786 the island and province belonged to the small kingdom of Keddah. In the war between the English and French, which terminated in 1783, the want of a good harbour in the southern part of the Gulf of Bengal was much felt by the British, and in 1786 they became desirous to acquire one on the eastern shores, as the coast of Coromandel does not offer such a place. The Island of Penang was found fit for that purpose, and it happened to be the property of an Englishman, Capt. Francis Light, of a country ship, who had received it from the king of Keddah as a marriage portion with his daughter. Capt. Light transferred his property to the East India Company, and was appointed first governor of the island. It was at the same time agreed to pay 6000 Spanish dollars annually to the king of Keddah in consideration of his ceding the sovereignty of the island. The British flag was hoisted on the 7th July, 1786. When the harbour began to be frequented by numerous vessels, great inconvenience and frequently loss were experienced, especially by the native merchants, from the piratical vessels which infested the strait and took refuge in the rivers which enter the sea opposite the island. The Company was accordingly desirous to get possession of this coast also, and as it then was nearly uninhabited, the object was attained by increasing the annual payment to the king of Keddah to 10,000 Spanish dollars. This country, which then contained only 1500 inhabitants, including a very few Chinese, was then termed Point Wellesley, which, not being a very correct designation for a line of coast, was subsequently changed to Province Wellesley.

(Crawfurd's *Journal of an Embassy to the Court of Siam and Cochin China;* Finlayson's *Account of the Mission to Siam and Hue;* Ward's *Short Sketch of the Geology of Pulo Penang,* in 'Asiatic Researches,' vol. xviii.; and Capt. Low's *Dissertation on the Soil and Agriculture of Pulo Penang and Province Wellesley,* Singapore, 1836.)

PENATES were Roman deities who were supposed to preside over families and houses. Cicero (*De Nat. Deor.*, ii. 27) derives the word either from *penus*, 'food,' or *penitus*, 'innermost;' but it appears probable that the latter etymology is the more correct. We learn from Festus (*Penus*) that the inner part of the temple of Vesta was called Penus, which seems to be connected with *penates*, *penetrare*, and *penetralia*. The hearth of the atrium was sacred to the Penates; and as this place was the innermost or most important part of the house, it was called the Penetralia. There appears sometimes to have been a kind of recess in the wall, called *sacrarium*, in which the images of the Penates were kept. (Cic. *in Verr.*, iv. 2; *Dig.*, i., tit. 8,

s. 9.) Every master of a family was the priest to the Penates of his own house.

It is a matter of some difficulty to determine who the Penates were; but there is no reason for believing that they were the same in every family. Some writers have thought the Lares and Penates to be the same, and it would appear that the Lares were included among the Penates. The Lares however were of human origin, and appear to have been regarded by the Romans as the manes of their ancestors [LARES]; while among the Penates we find mention of the superior gods, as Vesta and Jupiter. (Festus, s. v. *Herceus.*)

There were also public Penates, who were supposed to have been brought by Æneas from Troy. They were represented as two young men with spears in their hands, and the temple or chapel in which they were worshipped was not far from the temple of Vesta. (Dionys., i. 68; Cic., *De Nat. Deor.*, ii. 27; Liv., xlv. 16.)

The modern Genoese retain the custom of keeping household gods like the antient Romans. There is no house without its Lararium, and the Penates are conspicuous in every shop, indeed perhaps more so than in any other part of Italy. (*Communication from Genoa*, 1839.)

(Hartung, *Die Religion der Römer*, p. 71-81.)

PENCIL, the name given to the small brushes used by artists, whether made of hog's bristles, camel hair, fitch, or sable. The larger brushes are sometimes set in a tin tube, and the smaller in quills of different sizes. The hairs of a well-made brush should, when wetted, terminate in a fine point.

The well-known black-lead pencil is made by cutting 'Cumberland lead,' or plumbago, into thin plates with a saw, and again into strips as wide as the plate is thick. These strips are then laid in a groove in a piece of cedar, upon which is glued another and thinner piece: the whole is afterwards rounded by a plane adapted to that purpose. Pencils are commonly marked with certain letters to denote the quality of the lead, as H for hard, B for black, M for medium, and so on.

Other pencils are made of black and coloured chalks for drawing, and are much more convenient than the port-crayon.

The ever-pointed pencil is an instrument so simple and so well known as to require little description. The point, or nozzle, is made hollow to receive a small cylindrical piece of black-lead, about three-quarters of an inch long, which cannot pass through the lower end without some little force. Within the case is a screw or worm, which, if the case be turned round by one hand while the point of the pencil is held by the other, causes a wire or mandril, about the same size as the lead, to advance or retire. When a fresh lead is put into the point, the case must be turned round towards the left until the mandril is drawn up as far as possible. The point containing the lead is then to be screwed on to the case; and the case being turned gently to the right hand, the lead must be forced forward until it can just be seen at the point. These leads are made of different degrees and sizes, and the cases are marked accordingly. The leads are manufactured in the following manner:—After the plumbago is cut into square strips of the same diameter as, or a little greater than, the lead required, they are passed successively through three ruby holes, each smaller than the preceding. By this means they are rendered perfectly round and smooth, so as to offer no impediment to the working of the pencil. Most cases are made with a reservoir at the top, in which a supply of five or six leads may be carried.

PENCIL, a term of optics, and sometimes of geometry. A pencil of rays is a collection of rays which converge to or diverge from the same point; and a pencil of lines is a number of lines which meet in one point.

PENDENNIS CASTLE. [FALMOUTH.]

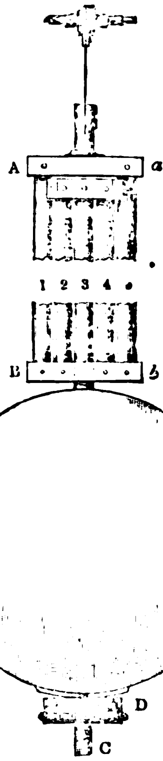
PENDENT, or PENDANT, in Gothic architecture, an ornamental mass of stone, hanging down or descending from the intersections of a groined vaulting. Pendents, no doubt, originated in bosses, of which they may be considered an enlargement, and may be described as being of a corbel or bracket shape. They are almost peculiar to the later florid English or Tudor style, in roofs of fan-work tracery, of which they are highly beautiful features, admitting of great variety of design. The roofs of King's College Chapel, Cambridge, St. George's, Windsor, and Henry VII.'s Chapel are fine examples of the effect of pendents. Carved pendents of a different kind were frequently employed for the enrichment of timber-roofs, but are not similarly applied, being suspended, not from the centre of the roof, but at the extremities of the hammer-beams, from which the ribs of wood-work forming the arches of the roof spring. Of this kind is the roof of the hall of Eltham Palace.

PENDENTIVE, though often inaccurately used as synonymous with pendent, has quite a different meaning, of which however hardly any explanation is to be met with in any English architectural works, nor is it indeed very easy to describe the thing itself intelligibly without the aid of drawings. Strictly speaking, pendentives are the spandrels or triangular spaces between the arches or arch-headed walls, as the case may be, supporting a dome, which is continued down to the springing of such arches; consequently where the dome rises from the cornice of a cylinder of the same diameter (as in the Pantheon at Rome), there are no pendentives, although there may happen to be arches in the cylindrical or polygonal circumference beneath the cornice. In such case the spandrels, or spaces between the arches are very improperly called pendentives, notwithstanding that they sometimes are so, pendentives being those portions of the inner surface of a dome where the latter is intersected by vertical planes, whether produced by voids or solids. The dome of the hall or principal office of the London and Westminster bank is a pendentive one.

PE'NDULUM, *Clock and Compensated.* The sensible equality of the oscillations of a weight suspended by a string or wire was first applied as a regulator to a clock by Huyghens about 1657. The successive improvements in the escapement, which sustains the motion of the pendulum and records its vibrations, and those in the pendulum itself, which secure a perfect equality in the duration of each oscillation, have finally produced the astronomical clock, the most accurate machine which man has hitherto constructed, and one of the most essential instruments in a modern observatory. For the construction of a clock and of its escapement, see HOROLOGY. We shall suppose that the dead-beat, or Graham's escapement, is that adopted, as it is undoubtedly the best of those yet discovered. The pendulum attached to ordinary clocks requires no description. The way in which motion is communicated to it is as follows:—The pallets PQ ['Dead-Beat Escapement,' HOROLOGY, p. 302] have motion on an arbor which passes through *p*, and has its pivots resting in holes in the clock-frame. A slender bar or wire, called the *crutch*, is attached to this arbor, and a notched piece projecting forwards and backwards from the crutch clasps the rod of the pendulum. The pendulum is hung from a cock at the back of the frame, and moves with the crutch. The clasp of the pendulum by the crutch should neither be very tight nor very loose, and the axis of motion of the pendulum should be exactly in the continuation of the arbor of the crutch. The clock-frame itself must be firmly fixed, as any shake or looseness of the support of the pendulum will alter its time of oscillation: the bob should be heavy and the arc of vibration small; and when good performance is required, the rod should be of deal, well varnished or oiled. Iron-wire makes the next best rod, and brass the worst. Whenever a brass rod is used for an ordinary clock pendulum, the maker is not master of his craft, or thinks little of his customer's knowledge. The errors arising from changes of temperature when deal, steel-wire, and brass are used are as 1, 3, and 5. It must however be remembered, that unless the deal rod pendulum be coated over, so as to be impervious to moisture, it will be liable to small errors arising from that cause. A range of 50° will not alter the rate of a clock with a white deal pendulum more than 5s a day, if Capt. Kater's value of the expansion of deal be correct.

In a well-made clock, the error arising from expansion from temperature is the most considerable, and is that which is to be guarded against. Before explaining more accurate and costly contrivances, it will be well to point out one recommended by Mr. Francis Baily. (*Mem. Astron. Soc.*, [illegible] p. 381.) Take a cylinder of lead about 14 inches long, pierced through its axis, as a bead, with a hole large enough to admit freely the rod of a wooden pendulum. This lead cylinder rests on a nut which works on a screw in the continuation of the rod below. The rod itself, from the centre of motion to the nut, will be about 46·0 inches. As it is easier to cut the cylinder shorter than to lengthen it, and as the expansion of the spring is not allowed for, and that of the wood is somewhat uncertain, it will be better to make the leaden cylinder an inch longer for a first trial; but even if the pendulum should turn out to be *under* compensated, an additional ring of lead may be added, above or below, of the thickness required. A lenticular form may be given to the weight, provided the proper length be preserved, and this will be an improvement, as it diminishes the resistance of the air, and the error which arises from the inertia of the air carried by the pendulum.

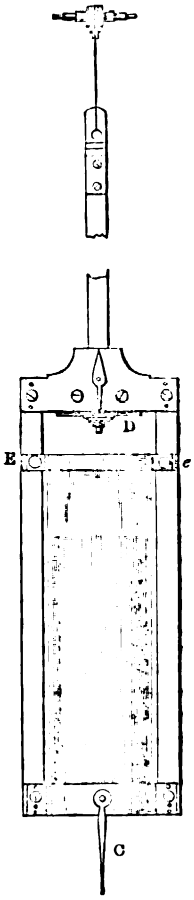
To the best clocks, either the gridiron pendulum of Harrison is applied (which was once chiefly used in England, and is still in repute abroad), or the mercurial pendulum of Graham, which is now employed by most makers in this country.



Gridiron Pendulum.

The above figure is not exactly the pendulum as composed by Harrison, but according to his principle. The *steel* rods 1 and 5 are pinned into two brass cross-pieces, A*a*, B*b*. The *zinc* rods 2 and 4 are pinned below into B*b*, and carry a cross-piece above, into which the *steel* rod 3 is pinned. Rod 3 passes *freely* through a round hole in B*b* (this is shown by dotted lines), and is tapped into a screw below; the bob rests upon the nut, which works on the screw. The steel rods 1 and 5 expand downwards, the zinc rods 2 and 4 expand upwards, and the steel rod 3 downwards; and it is possible so to adjust their lengths (the expansion of zinc being *more* than double that of steel) that the effects of the expansion downwards and upwards shall have no effect on the length of the pendulum or time of oscillation.

Harrison used brass instead of zinc for the upward expansion; and in order to produce a perfect compensation, was forced to use four more rods, a second pair of brass to expand upwards, and another pair of steel to expand downwards: nine in all. The foreign artists use zinc, which requires only five bars, less workmanship, and only one nice fitting. Zinc is objectionable as being a weak metal, and it is said by some persons to expand by jumps, which seems not very probable unless much exposed. The great objection to the gridiron pendulum is that the astronomer, if he be no workman, must rely upon the artist for perfect compensation (and this is perhaps never achieved); and again, if from rust or bad fitting the slipping parts should bind, the action will necessarily be by bounds and irregular. After the clock-maker has done his best, a year's experience will point out the error in the compensation, which can be easily remedied, if the fault be over-compensation, by cutting the zinc rods shorter. All the fixed parts should then be secured as firmly as possible by steady pins, as any attempt to reserve a power of further adjustment would be too dearly purchased by a ricketty frame. One or two flat brass horizontal bands are attached to 1 and 5 to keep the zinc rods in their places. These bands should not squeeze the zinc, and but just press against them with the spring of the metal. (Harrison is said, by Short (*Phil. Trans.*, vol. 47, p. 517), to have invented his pendulum about 1725.)



Mercurial Pendulum.

In Graham's pendulum, a glass jar, partly filled with mercury, is supported in a sort of steel stirrup. The pendulum rod passes through the top of the stirrup, and is held by a nut and adjusting screw at D. The height of the mercury in the jar is about 6·7 inches; but this will vary somewhat with the diameter of the jar, the substance of the rod and frame, and perhaps the variable expansion of the steel rod. The compensation can be altered, and finally perfected, by the astronomer. This quality, and the absence of any nice fitting or slipping parts, give Graham's construction a very decided superiority over Harrison's, especially for a clock which is not to be moved from place to place. These mercurial pendulums are generally constructed in a more expensive manner than is necessary. The vertical rods may all be made of stout steel wire, and the base and top of the stirrup of brass. Mr. Baily, in his valuable memoir above referred to, very justly recommends that the thread of the regulating screw should be deeper and coarser than it is usually made, and be tapped on a stouter cylinder. Graham's pendulum is described by himself. (*Phil. Trans.*, vol. 34, p. 40.) It was invented in 1722. There are many ways of compensating a pendulum for the effects of temperature, some of which are very ingenious, and others very simple. Those above described will suffice for an explanation of the principle; they are the most usual, the most easy of execution, and most exact in their operation.

If an escapement could be contrived which gave its impulse to the pendulum at the middle point of its vibration, and was wholly *detached* from it at all other times, such an escapement would be perfect; and escapements are almost to be considered good or bad as they approach this character. But in those which at present exist, time and dirt and thickening of the oil not only affect the amount of the impulse, which is comparatively of slight moment, but the continuing action of the teeth on the pallets is also irregular. The space through which the pendulum swings, or *arc of vibration*, is thus liable to variation, which again produces a change in the time in which each oscillation is performed, that is, if the pendulum be supposed to oscillate round a fixed axis. This inequality was more apparent in the early clocks, where the pendulum was light and the arc of vibration very large, than in those of modern construction, where the pendulum is heavy and the arc small. Huyghens proposed a most ingenious remedy, viz. that the upper part of the pendulum, which he made of two parallel strings, should wrap and unwrap on two cheeks, which, being shaped as cycloids, caused the bob itself to describe a cycloid. Now it is a property of this curve that all arcs are described in the same time, so that Huyghens's construction was a perfect remedy of the error mentioned. It is said by all later writers on the subject that the remedy is worse than the disease; and it is possible enough that something like sticking between the flexible top and the cycloidal cheek may take place at the critical point, *i.e.* just when the pendulum has arrived at the end of its swing, and is pausing for its return; and that there may be a difficulty in making and setting the cheeks so truly as to act on the pendulum in every part of its swing. A second objection alleged against Huyghens's cheeks—that, as the pendulum cannot be considered to be a heavy point suspended by a rod without weight, the centre of oscillation shifts *downwards* as the flexible portion of the top wraps on the cheek—might be easily got over by making the cheeks not truly cycloidal, but of such a form that the centre of oscillation of the compound pendulum shall oscillate in a cycloid, which would be easy enough when the form of the pendulum was given. In truth this is a matter of mere speculation in astronomical clocks, for there is a much easier way of producing sensible isochronism in them, which we will describe; but we suspect that the cycloidal cheeks might still be used advantageously in clocks which resemble Huyghens's, as the Dutch clocks which are in common use.

Instead of suspending the pendulum by a perfectly flexible string, or on a knife-edge, when the motion must be in a circle, the top of the rod ends in a flat spring. (See the foregoing figures, where the spring is seen in front, like a fine line, at the top of each pendulum.) This produces two effects upon the time of oscillation: first, by retarding the motion of the pendulum in its rise and accelerating its fall, the spring shortens the time of vibration, and the more the stronger it is; but as its action at each point is nearly proportional to the degree in which it is bent, that is, as the arc of vibration reckoned from the position of rest, this action will have no tendency to alter the isochronism of unequal arcs. The bending of the spring has however a second effect, that of causing the bob of the pendulum to describe a curve which is not circular, but which falls within a circle; and this, by proportioning the strength of the spring to the weight of the pendulum, may be made to approach to Huyghens's cycloid, or to that modification of it which we have described. It is possible to select a spring of such strength as shall completely satisfy this condition, at least within the necessary limits, that is, for such variations in the moving power as arise from dirt, thickened oil, and wear in the works.

Mr. Frodsham has lately published the *results of experiments on the vibrations of pendulums with different suspending springs*, which are deserving of attention. He found that a spring of a particular strength rendered the oscillations of a pendulum of a certain weight isochronous, and that a considerable alteration in the length of the spring did not affect this quality of isochronism. This we should explain by supposing the lower part of the spring not to have acted when it was longest, but to have always preserved its rectilinear form. In no case does Mr. Frodsham seem to have found a spring which caused the clock to *gain* in the larger arcs, which, on the information of other makers, and on theoretical grounds, we consider possible. With a spring stiffer than that which was isochronous, Mr. Frodsham found that using as effective lengths 0·97, 0·66, and 0·50 of an inch, the change of rate produced by using 4lb. 1oz. as the weight, instead of 2lb. 2oz., was to give the clock a losing rate of $3{\cdot}7^{s}$, $2{\cdot}6^{s}$, and $3{\cdot}5^{s}$ respectively. The law is not apparent, and it would seem that, even with this spring, shortening the spring had no sensible effect. Another remark of Mr. Frodsham's, which is very valuable if it is confirmed by extended trials, is, that the spring which produces isochronism is also the spring with which the pendulum, unattached to any clock, will keep up its motion for the longest time. It seems to us probable that this latter quality will belong to the weakest spring which preserves its full elasticity under the pull of the bob; for if the elasticity were perfect, the only cause of loss of motion would be the resistance of the air, which is not sensibly altered by the effect of the spring. However this may be, the subject is well worth further consideration. Notwithstanding the care bestowed by Mr. Frodsham, it is difficult to conduct inquiries of such nicety with an uncompensated pendulum. It will also be necessary, as we shall now point out, to attend to the state of the barometer when the experiments are in progress. For when the effect of the air upon the time of oscillation of a pendulum is examined, it will be found that the *resistance* of the air has no influence except the indirect one of shortening the arc of vibration, that is, of tending to make the clock gain, if the bob move in a circular arc. The *buoyancy* of the air acts more immediately, for it diminishes the *weight* of the pendulum, and leaves the *inertia* unaltered, and therefore diminishes the accelerating force. Hence a greater density in the air acts as a diminution in the force of gravity, *i.e.* makes the clock go slower. The effect is greater indeed than was at one time anticipated; for, as was remarked by Du Buat fifty years ago, and as has been recently shown by Bessel, the pendulum must be considered to include in its inertia a small wrapper of air which is involved in it or accompanies it in its course. (See a very elaborate and valuable memoir by Mr. Baily 'On the Correction of a Pendulum for the Reduction to a Vacuum,' *Phil. Trans.*, 1832, p. 399.) This latter portion of the effect of the air depends on the form of the pendulum and possibly may even be affected by the polish of its surface. Now the density of the air is proportional *directly* to the pressure of the atmosphere shown by the barometer, and *inversely* to the temperature, which is known from the thermometer. The latter portion might be practically included in the general compensation for temperature, but the former requires either a specific and peculiar compensation, or may be determined as a residual quantity, and tabulated for each clock with the mean height of the barometer for the period required. There is an investigation of the effect of atmospheric pressure on the rate of a transit clock at the Armagh observatory, in the *Mem. Ast. Soc.*, vol. v., p. 125. The author, Dr. Robinson, assumes that the variations of a clock from a constant rate are expressed by the sum of two terms, one depending on the temperature, the other on the pressure of the atmosphere shown by the barometer. The isochronism of the spring is supposed, or that the effect of any change in the arc depending on the above two causes is already expressed in the terms. When the error in the compensation for temperature is determined, this can readily be rectified by altering the quantity of mercury in the jar. The compensation for the variation of atmospheric pressure was made by attaching small barometers to the pendulum rod, but we believe this ingenious idea was not attended with any practical benefit. It would perhaps be possible so to balance some of these contending principles as to obtain a performance nearly perfect; thus an arc of vibration might be selected in which the increased density of the air, by reducing the arc, might accelerate the time of an oscillation as much as the increased buoyancy and inertia would retard it, or so nearly so, that the remaining difference might be completely annihilated by a proper selection of the pendulum spring. But even if this should be effected, and we see no obstacle to it except the time and trouble it would require, a change of the moving power, or of the action of the escapement, would alter the arc and derange the equilibrium. As the effect of time is generally to produce a falling off in the arc, a small addition to the clock weight might be made from time to time, so as to bring back the pendulum to its primitive arc, until the clock is cleaned, and its action restored that way. We shall conclude this long disquisition (which we propose for consideration until decisive experiments are made) by a piece of advice which we can warrant. Where the clock is much exposed to variations of temperature, enclose it in a second covering or closet. This will protect it from injury, and moreover will very much regularise the rude transitions of temperature to which clocks are in this climate liable. It is not improbable that the parts of a clock, and of its pendulum, if much exposed, may take their temperature at different times, and if so, the compensating principle is not brought into action, the clock must act irregularly.

It has already been said that a clock, to go steadily, should be securely fixed. The common mode is to fasten the case by strong bolts, under the rising board and again also as low as the pendulum bob, to a stone pillar or through a wall. The pendulum is generally suspended from a cock on the back of the frame, but it may be supported on a triangle standing on the rising board, or even to the back of the case, but there is then a fear that the axis of motion may not be in the axis of the pallets, or may not keep so. The clock being fixed, the first step is to put it *into beat*, *i.e.* to make the beats follow at equal intervals. The clock-maker does this in common clocks by bending the crutch, but when the discrepancy is not great, any one may produce the desired equality by tilting the frame a little; in table clocks there are generally footscrews for the purpose, or if not, the feet may be propped by pieces of wood, card, &c. In astronomical clocks, the angle which the crutch makes with the pallets admits of a small adjustment by two screws, which act on opposite sides of the crutch, and the operation is performed as follows:—Make the beats nearly correct by ear, and by touching the screws note which screw belongs to the longer leg. Then by softly deadening the pendulum as it rises, make it just not escape on one side. By very gentle pushes cause it to escape on that side, and see whether it escapes on the other; if it does not, one screw must be screwed up and the other released. After a few trials and errors it will be found that when the pendulum just escapes on either side, it will just escape on the other, and if there be a very small inequality indeed, a little tightening of one of the crutch screws will complete the adjustment. The pendulum should then be brought to rest, and the zero of the plate on which the arc of vibration is read off, be fixed just behind the pointer of the pendulum, shown at C.

To bring a clock to time, first make it nearly right by the adjusting screw D, but let it have a losing rate, which must be determined by observation after the interval of one or more days. Suppose it is losing 3s a day. Put a weight, which has been carefully ascertained, say 200 grains, upon the plate which covers the jar (E c in the mercurial pendulum, in the gridiron pendulum anywhere near D b), and find the fresh rate of the clock by observation. Let it now gain 10s a day. Then, as 200 grains cause a gain of 13s a day, 46·2 grains will alter it 3s per day, and replacing the 200 grains with a weight of 46·2 grains will bring the clock to time. In an observatory it is always desirable that a clock should have a small losing rate, and be slow rather than fast (the corrections for clock error and clock rate are then additive), so that it would be better to add a smaller weight than 46 grains; and in any case it is more safe to destroy the rate by two operations, especially if the preceding rates were not very carefully determined.

The final adjustment of the compensation can be best accomplished when the clock has gone several months, and when the gain or loss in two of the warmest months in the year is compared with the gain or loss in two of the coldest. Suppose the mean temperature in the summer months of trial to be 30° higher than in the winter months, and that the clock loses 1s more in summer than winter; it is therefore *under-compensated*, and requires more mercury. Add 1 lb. of mercury, and bring it to a close rate exactly as before; and now let it be *over-compensated*, so that an increase of 24° in the temperature causes it to gain 0s·4 per day, which by simple proportion is the same as a gain of 0s·5 by 30° of temperature. Hence it is clear that as 1 lb. of mercury causes an alteration of 1s·5 in the variation due to temperature, if a third of a pound be withdrawn the compensation will be nearly *correct*. A second trial will perfect the compensation, which should never be afterwards disturbed.

Length of Simple and Invariable Pendulum.—The equality of the oscillations of a weight suspended by a line is said to have been used by Ibn Junis, A.D. 1100, and by the Arabian astronomers, for the subdivision of portions of time. (Young, *Nat. Phil.*, vol. i., p. 595.) This property of the pendulum was remarked by Galileo when a student at Pisa, by observing the vibrations of a lamp swinging from the roof of the cathedral, and was by him proposed as a medical instrument for observations on the pulse. (Drinkwater, *Life of Galileo*, p. 5.) The simple pendulum was much used as an astronomical instrument (called *perpendiculum* in the older writers) before it was adapted by Huyghens to the clock. Mouton (*Observationes Diametrorum Solis et Lunæ*, Lugd., 1670) applied the vibrations of the simple pendulum successfully to measure the time in which the sun and moon describe their respective diameters, and in the Appendix, p. 427, proposes his *nova mensurarum geometricarum idea*, i.e. a decimal system of measures based on the value of a minute in Riccioli's length of a degree. This is his *milliare*, the thousandth part of which he calls a *virgula*; and then finds by experiment that the *virgula*, which, according to Riccioli, is 5 ft. 4·363 in. Bolognese measure, is the length of a simple pendulum which makes 3272 oscillations in half an hour.

In 1671 Picart was sent to determine the position of Tycho Brahé's observatory at Uranibourg. He took this opportunity of swinging the pendulum, and found the length of the seconds pendulum 3 ft. 0 in. 8½ l. Paris measure, exactly the same as he had previously found it to be at Paris and subsequently at Cette, on the south coast of France. Romer obtained the same result at London, and these erroneous measures of Picart, the first astronomical observer of his day, were for a long time cited as objections to the theory of gravitation.

In 1672 Richer was sent to Cayenne (about 4° 56′ N. lat.) to make a course of observations, and among the rest to observe the length of the seconds pendulum. His words are: 'L'une des plus considérables observations que j'ay faites, est celle de la longueur du pendule à secondes de temps, laquelle s'est trouvée plus courte en Caïenne qu'à Paris: car la mesme mesure qui avoit esté marquée en ce lieu-là sur une verge de fer, suivant la longueur qui s'estoit trouvée nécessaire pour faire un pendule à secondes de temps, ayant esté apportée en France, et comparée avec celle de Paris, leur différence a esté trouvée d'une ligne et un quart, dont celle de Caïenne est moindre que celle de Paris, laquelle est de 3 pieds 8⅗ lignes. Cette observation a esté réitérée pendant dix mois entiers, où il ne s'est point passé de semaine qu'elle n'ait esté faite plusieurs fois avec beaucoup de soin. Les vibrations du pendule simple dont on se servoit, estoient fort petites et duroient fort sensibles jusques à cinquante-deux minutes de temps, et ont esté comparées à celles d'une horloge tres excellente, dont les vibrations marquoient les secondes de temps.' (*Recueil des Observations faites en plusieurs Voyages par ordre de sa Majesté*,* p. 66. Paris, 1693.) We have cited this passage textually, not only on account of its importance, but because it is generally merely stated that Richer's clock, which was regulated on Paris time, lost more than two minutes at Cayenne. This misrepresents the *evidence* of the experiment, and moreover leaves room to suppose that Richer made a *chance* discovery, whereas the determination of the length of the pendulum was one of the special objects of his mission (see p. 2). Neither Picart nor Richer gives any details of his *modus operandi*.

In 1673 Huyghens published his 'Horologium Oscillatorium,' perhaps the most remarkable mathematico-mechanical work which preceded Newton's 'Principia.' He therein explains the *isochronism* of oscillations in a cycloid, and the mechanical means of making the pendulum swing in a cycloid. He gives theorems for finding the centre of oscillation of several figures, and thence the length of the simple pendulum, corresponding to a compound pendulum of certain forms; and in propositions 19 and 20 (p. 124-5) proves that when the body is the same, the distances of the axes of suspension from the centre of gravity are reciprocally as the distances of the centre of gravity from the respective centres of oscillation, and that the point of suspension and centre of oscillation are convertible. His proposition 25 (p. 151) is on the mode of fixing a universal and perpetual measure, which he proposes should be the third part of a seconds pendulum, and names a *horary foot*.

Newton, in his 'Principia,' lib. i., s. 10, investigates the oscillations of a body in a cycloid, or in any other curve; lib. ii., s. 6, he considers the effects of a resisting medium on a pendulous body; and lib. iii., prop. 19, he determines the figure of the earth, supposing it to be fluid and of uniform density, to be a spheroid of which the equatorial and polar diameters are as 230 : 229. In prop. 20 he computes the lengths of the seconds pendulum and of the degrees of the meridian, which are required on the foregoing suppositions; and he remarks, 'Quod inæqualitas diametrorum terræ facilius et certius per experimenta pendulorum deprehendi possit quam per arcus geographice mensuratos in meridiano.' In the following pages is an analysis of the lengths of the pendulum which had come to his knowledge.

We have not been able to find any account by Graham himself of two very capital improvements which he seems to have introduced into pendulum experiments. The first is a clock, in which 'he carefully contrived that its pendulum might at pleasure be reduced to the same length whenever there should be occasion to remove the clock from one place and set it up in another.' (Bradley's 'Account of the going of a Clock by Graham, in London, and at Black River, Jamaica,' *Phil. Trans.*, vol. xxxviii., p. 302.) Probably this was done by drawing the spring through a slip to a given mark; for in another description of a similar clock it is said the suspending spring was broken. We do not however see need for any adjustment in this respect, if the spring be pinned into the rod and into its upper axis. The pendulum was not compensated, but a thermometer was enclosed in the clock, and as the rate in different temperatures at the same place had been determined, the reduction to a normal temperature was easy. Clocks of this kind were supplied to the French expeditions for measuring arcs of the meridian in Lapland and Peru. For this latter expedition Graham supplied Godin with a *detached* pendulum, which Godin thus describes:—

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* This volume contains Picart's observations, as well as Richer's.

'Ce pendule est composé en general d'un fil de cuivre, d'une boule de même matiere à un de ses bouts, et d'une piece d'acier taillée en couteau à l'autre bout, qui est celui de suspension: ce couteau porte sur deux montants d'acier en deux points qui designent l'axe du mouvement du pendule.' (*Acad. Roy. des Sciences*, 1735, p. 507.) He says its motion was sensible for eighteen hours. It seems that this pendulum, the vibrations of which were to be counted by a clock, was also intended to measure the actual length of the pendulum. Messrs. Bouguer and La Condamine both had detached pendulums made after Graham's idea. Bouguer (same volume, p. 526) describes this pendulum as an invention of his own; La Condamine (*Journal du Voyage*, p. 143) is more open, and says he took the idea from a copy which Hugo made after Graham's. This is almost exactly Kater's invariable pendulum. Mairan's measurement of the length of the seconds pendulum (*Acad. Roy. des Sciences*, 1735, p. 153) is a good specimen of the old method of measuring the length of the pendulum: and the measures of Godin, Bouguer, and La Condamine, in the same volume, are worthy of notice. For references to various pendulum experiments, see Lalande, *Astronomie*, 3rd edit., s. 2710, *et seq.*

In the first volume of the 'Transactions of the Society of Arts,' p. 238, Mr. Hatton proposed, as a mode of fixing a permanent standard of length, to suspend a weight from a fine hair to a clip in an upright bar, sliding up and down in a vertical frame. The hair passed through a fixed clip. The weight was to be swung, and the vibrations counted, in two positions of the bar, and from the difference in the times of vibration and the space through which the bar was moved, the length of the seconds pendulum was to be computed.

In 1787 Mr. John Whitehurst published 'An attempt towards obtaining invariable Measures of Length,' &c., which is remarkable for its ingenuity. He suspended a leaden ball with a flat steel wire in front of a straight upright frame, the wire being long enough to make forty-two oscillations in a minute. A clock with dead-beat escapement and a clip to hold the wire was slid up and down the frame, and secured and adjustable at two points where the clip made the free oscillations respectively forty-two and eighty-four in a minute The crutch of the clock, being continued upwards in a screw, carried a weight, by moving which the oscillations of the crutch *alone* could be regulated to forty-two and eighty-four oscillations, and *therefore would not interfere with the free oscillation of the ball and wire, but only keep up their motion.* The going weight of the clock was in each case such as sustained an oscillation of 3°. It is clear that if all were properly executed, the clock-frame with its clip must have been shifted between the two positions through a space equal to the difference between the simple pendulums which correspond to forty-two and eighty-four oscillations per minute. A line was drawn in each position along the upper edge of the clock-frame upon a brass rule fixed to the upright support, and this space was afterwards accurately measured, and the length of the simple seconds pendulum thence computed. Whitehurst's length of the seconds pendulum is 39·1196 inches of Troughton's standard, but the corrections for the buoyancy of the air and for temperature are not introduced. It is probable that he introduced greater errors than those he wished to get rid of in Hatton's method, for the real difficulty is not that of counting the vibrations, but of measuring the length between the two clips, in avoiding the errors of temperature and the uncertainty as to the effective point of suspension. The *principle* of Hatton's method, that of measuring the difference between two pendulums, has been adopted, as we shall see, by Bessel.

The foregoing account is merely a sketch of the history of this mechanical problem, which, in the hands of Borda, and more recently of Kater and Bessel, has received a more accurate solution. There are still anomalies and imperfections in some parts of the processes which require clearing up, but the errors have been reduced within comparatively moderate limits. Before describing these experiments we shall give a brief account of the formulæ which they require.

The expression which connects the time of one oscillation of a simple pendulum in an infinitesimal arc, with its length l, at a place where the force of gravity is represented by g, is $t = \pi \frac{l^{\frac{1}{2}}}{g^{\frac{1}{2}}}$, π being 3·141596, or circumference to diameter 1; the measure of gravity, g, being twice the space through which a body would fall freely in 1^s, or, what is the same thing, the space through which a body would move in 1^s, with the velocity which it acquires in falling freely for 1^s.

Hence, if l be the length of the simple seconds pendulum, $g = \pi^2 l$; therefore g is known when l can be measured. The process therefore of finding the effective force of gravity at any place is reduced to finding the length of the simple pendulum which vibrates seconds.

The French astronomers, in their great survey of the arc of the meridian, determined the *absolute* length of the pendulum at different stations between Dunkerque and Formentera, and also in the continuation to Unst in the Shetland Isles, which is included in the English Trigonometrical Survey. It is however an operation of great delicacy, and when only the *variation* of gravity between different places is required, as is the case in researches into the figure of the earth, the observation may be more easily performed by swinging the *same* pendulum in different places, and ascertaining the number of vibrations which it makes in a day. Thus if n and n' be the number of vibrations made in a day by the *same* pendulum l, at two different places at which the forces of gravity are g and g', and the duration of one vibration at each place be t and t', then since the time of one vibration = a day divided by the number of vibrations, we shall have

$$\frac{1}{n} : \frac{1}{n'} :: t : t' :: \pi\left(\frac{l}{g}\right)^{\frac{1}{2}} : \pi\left(\frac{l}{g'}\right)^{\frac{1}{2}} :: \frac{1}{g^{\frac{1}{2}}} : \frac{1}{g'^{\frac{1}{2}}},$$

$$\text{or } g : g' :: n^2 : n'^2.$$

That is, the force of gravity varies as the square of the number of vibrations of a given pendulum in the same time, which is usually taken to be a mean solar day. If therefore the number of vibrations of a pendulum in a day at a given place, London for instance, be known, and it is then transported to different places, and the number of vibrations in a day counted, a simple proportion will compare the forces of gravity at London and every place at which the observation has been made.

If the length l' of the simple pendulum at any station be required from these observations,

$$\text{since } l : l' :: g : g' :: n^2 : n'^2,$$

$l' = \frac{l n'^2}{n^2}$, which gives the length of the pendulum at any place in terms of the length at London, and the number of vibrations per diem at that place and London.

Though it scarcely belongs to our subject, we will give the expression by which the ellipticity of the earth is determined from pendulum observations. The length of the seconds pendulum at any latitude, λ, may be supposed $l = A + B . \sin.^2 \lambda$, where A and B are constant quantities. Now from all the good observations, either of the actual length or the number of vibrations per day of the same pendulum, determine the values of A and B; then by Clairaut's theorem,

$$\text{the ellipticity of the earth} =^{*} {\cdot}008668 - \frac{B}{A};$$

whence the ellipticity is found. By ellipticity is meant the excess of the equatorial over the polar radius of the earth, divided by the polar radius.

The apparatus of Borda will be generally intelligible from the following description and perspective plate.

The plumb-line is suspended from a knife-edge piece A B, and is attached below to a cup E, which is ground to fit very exactly the platina ball below. A little grease is rubbed on the inside of the cup, making the contact perfect enough to exclude the air and to suspend the ball. The knife-edge rests on agate planes, a, b, which are carefully levelled, and the frame C D, which carries the planes, is fixed immoveably in a horizontal position. The plumb-line is in front of the comparing clock, which has a small cross drawn on the bob. When both are at rest, a telescope having a vertical line in the focus is placed a few feet distant, so that the cross, the plumb-line, and the fixed wire of the telescope are all in the same right line, and all seen to

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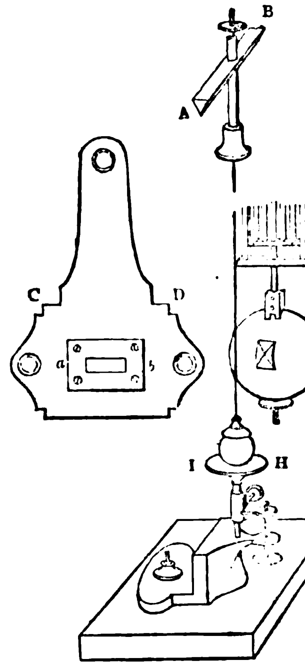
* This is Mr. Airy's value for $\frac{5m}{2}$ where m is the ratio of the centrifugal force at the equator to the force of gravity there. (*Encyclopædia Metropolitana*, 'Figure of the Earth,' sect. 2.) Biot, *Astronomie*, vol. 3, ad finem, [illegible] gives 0·00863; the centrifugal force m being supposed $\frac{1}{289}$ of the force of gravity at the equator.

*anctly.** Such a length is given to the plumb-line, as that its oscillations shall be a little slower than those of the clock.



Borda's Pendulum apparatus.

The clock is now set a-going, and when it is quite steady, the platina ball is drawn a little on one side, and made to swing through a very small arc, one or two degrees at the most. The observer then places himself at the telescope, and notes the exact beat of the clock when the plumb-line meets the cross and coincides with the fixed wire at the same time: this is called a *coincidence*. As this observation seems much less definite than in Kater's method, it is better to note those beats before and after the coincidence, when the eye cannot distinguish whether it is a coincidence or not, and to take the mean of the two for the true time of coincidence. Immediately after, the extent of the arc through which the plumb-line swings is to be read off on a scale placed just behind it; the thermometers which are near the pendulum must also be read off, and the height of the barometer. The observer now waits until this appearance presents itself a second time (which may be in about ten minutes, though the interval is quite *ad libitum*), and having thus established the time which elapses between the observations, he may leave the apparatus for three, four, or five hours, when on his return the same observations must be repeated of coincidence, arc, temperature, and barometer, and the series is finished. We should recommend closing as well as commencing a series with two coincidences *ad majorem cautelam*, but except as a check, no observations are required except the first and the last. The plumb-line is again set in motion exactly as before, and the second, third, and following series observed. The rate of the clock is established by astronomical observation.

After a satisfactory number of series has been taken, the next object is to measure the length of the pendulum. The plane I H is raised by a fine screw until it just touches the bottom of the platina ball. This is an operation of great delicacy, and must be effected by two or three trials, as the *exact* temperature of the wire at the *exact* moment of contact is required; and the presence of the observer, even for a short time, is sufficient to affect a slight wire very sensibly. Suppose this done, the apparatus is removed or moved on one side, and a bar, which has a knife-edge above and a sliding tongue below, is suspended in its place. The tongue is slid down until it touches the plane I H, and the distance between the knife-edge and the bottom of the tongue measures the distance between the top and bottom of the pendulum. This distance may be measured in several ways; the French astronomers use a contrivance which need not be described here.

One of the great practical difficulties in this species of pendulum experiments seems to be the extreme and sudden sensibility of the plumb-line to temperature. The whole apparatus is enclosed in a glass cage to exclude currents of air, and the observer is particularly careful, after bringing the lower plane into contact with the bottom of the ball, to absent himself until the temperature is steady, and then to make the contact complete. It is another objection that the different manipulations required are of great delicacy, and therefore not suited to every observer and every place; but when the utmost care and skill are employed, the results appear satisfactory.

The knife-edge, A B, by which the line and ball are suspended, is an ingenious contrivance, exactly similar to Whitehurst's synchronous crutch above described. By the upper screw and weight, the oscillations of the knife-edge *alone* can be made synchronous with the oscillations of the whole pendulum, so that the oscillations are just the same as if the knife-edge were immaterial, and the point of suspension exactly in the line of its edge. The platina ball can be suspended from any side, and if two positions diametrically opposite be taken, the effect of any irregularity of shape or density disappears from the mean of the two results. There are several corrections to be applied to the quantities immediately given by observation, before the length of the simple pendulum can be concluded. The oscillations are made in an arc of sensible extent. Now the time of oscillation in an arc of A° on each side the lowest point, is greater than the time in an infinitely small arc (which is the arc required), in the proportion of $1+\frac{\sin.^2 A^\circ}{16}$ to 1. An expression which depends upon the first and last arcs of each series, gives the correction which is to be added to the number of oscillations observed. This is taken from a table. Between each coincidence, the plumb-line has made two oscillations less than the clock, therefore subtracting twice the number of coincidences from the number of seconds elapsed between the first and last coincidences, you will have the number of oscillations of the pendulum during a certain time shown by the clock. Each of these numbers requires a correction: to the number of oscillations of the pendulum, must be added the correction for arc just mentioned; and to the time as shown by the clock, the proportional part of its rate during the experiment. A simple proportion will now give the number of infinitely small vibrations in 24 hours.

Further corrections are to be applied. The length of the wire and ball during the observations must be reduced to the length they would have had at the temperature when the contact with the plane and the measurement was made, and this again must be converted into the equivalent length when the thermometer is at the freezing-point, which is the French standard temperature. The theoretical pendulum is supposed to swing *in vacuo*, and as the density of the air affects the time of oscillation two ways, both by diminishing the moving force of the pendulum and by adding* to its inertia by the air carried along with it, a correction is required on this account, which depends upon the barometer and thermometer, on the specific gravity of the materials of the pendulum, and also on its form.

From the dimensions and specific gravities of the parts of the apparatus, the distance between the centre of oscillation and the bottom of the ball can be computed. Hence the length of the simple pendulum, which oscillates in an infinitely small arc a certain number of times in a day and *in vacuo*, can be assigned, from which the length of the seconds pendulum is deduced by simple proportion.

If the place of observation be above the level of the sea, it is usual to reduce the length to what it would have been at the sea-level. This is a very uncertain quantity, as it depends upon the configuration and density of the strata in and near the spot. In the earlier experiments gravity was supposed to vary inversely as the square of the distance from the centre of the earth, and thus the attraction of the matter between the observer and the sea-level was wholly neglected. Dr. Young showed that in a table-land of average density the correction thus obtained was too large, and should be multiplied by 0·66.

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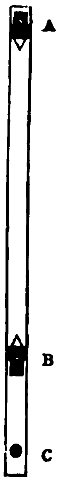
* This is not always practicable, and it would, generally speaking, be better to place a lens between the cross on the clock-bob and the plumb-line, and to throw an image of the cross upon the plumb-line. It is desirable on many accounts that the two pendulums should not be very near each other

* This part of the correction due to the air was omitted in the French experiments and in Captain Kater's: see Mr. Baily's memoir referred to above, and Air.

For a full description of Borda's method, with instances, &c., see *Base du Système Métrique Décimal*, vol. iii., p. 337 (Borda's original memoir); and again, vol. iv., p. 441 ('Observations from Formentera to Unst').

Many modifications and improvements have been introduced into Captain Kater's method of determining the length of the pendulum, and we must refer to his paper (*Phil. Trans.*, 1818, p. 33) for a minute description and for a plate of his apparatus.

The principle of his method is founded on the beautiful dynamical theorem due to Huyghens, which we have already mentioned, namely, that the axis of suspension and centre of oscillation are reciprocal in the same body. Now conceive two wedge-formed pieces of steel (knife-edges), with the sharp edges towards each other and parallel, to be fixed at right angles to a bar of any form whatsoever, and in a line passing through its centre of gravity; then if the time of oscillation on either edge be the same, the distance between the knife-edges is the length of the simple pendulum which swings in the same time. Captain Kater, in his experiments, used a pendulum of an inconvenient form, the same nearly as in his invariable pendulum (see cut of Kater's invariable pendulum), with a second knife-edge below the centre of the bob, and there are several doubtful points in the reductions which he employed and the subsequent measurement between the edges; still his memoir must always be carefully perused by any future experimenter who wishes to make himself thoroughly acquainted with the subject. The method of observing the coincidences is remarkably ingenious and accurate.



Baily's Convertible Pendulum.

We conceive that the best form of pendulum for the object of measuring the actual length according to Kater's method is that adopted by Mr. Baily. A C is a rectangular bar, with one knife-edge at the end A, and the other at B, about ⅔ of the length from the same point. A should be as near the end as sound workmanship will allow. The necessary verifications, namely, the parallelism of the knife-edges, their perpendicularity to the bar, and that the line which joins the knife-edges passes also through the centre of gravity, are all very simple, and there is little difficulty in adjusting the oscillations on each knife-edge to synchronism.[*] This bar pendulum is suspended on agate planes in front of the clock, great care being taken that the support is perfectly firm and the agate planes horizontal. A white disc of a spindle shape and exactly the width of the bar is pasted on the clock bob, and the viewing telescope fixed in a line with the disc and bar, so that, both being at rest, the white disc is just covered by the bar. Captain Kater used a diaphragm in his telescope, the sides of which were parallel to the bar and touched its edges; but it has been found more convenient to place a pair of parallel plates between the bar and the disc, the sides of which are so adjusted as just to allow the disc on the clock bob to be seen between them. There is a divided scale to mark the arc of vibration, two or three thermometers hung at different heights about the pendulum bar to register the temperature, and a barometer for the atmospheric pressure, all which are to be read at the beginning and end of each series. The observation itself is of the simplest kind. Set the clock going, and when its arc is steady, give the pendulum a small motion, 1° or 1½° at the utmost. The white disc, which is at first wholly visible, is gradually invaded by the bar, till at last it is entirely covered, first one side and then the other disappearing.[†] These times of *disappearance* are to be noted. Almost immediately after, the white edges reappear, first on one side and then on the other, and these *reappearances* are noted. The mean of the four gives the tru time of coincidence. It has been found convenient practice not to make the adjustments with the hig degree of precision, for you are then in doubt on w side the first disappearance and reappearance will ta place; whereas if there is a very little displacement, atte tion need only be fixed on every alternate beat, which less strain on the eye and on the mind. This displaceme however must be trifling, otherwise, when the arc becomes small, the disappearances and reappearan will not take place. The reductions for the rate of clock, for the arc of vibration, the temperature, the bu ancy of the air and its inertia, and the height of the p of observation above the sea-level, are all to be made as Borda's pendulum. For the details we refer to the standa memoirs which have been published on the subject. B there are two or three points which deserve more atten than they have generally met with. The clock is only be considered as a counter of the vibrations, and to av any error arising from its irregular rate, the observat should be continued without intermission between t epochs, at each of which the error of the clock is ascertained by astronomical observation. If this be done, t only reliance upon the clock is for the short time wh elapses between the last coincidence of one series and first of the next. It is true that this mode of observi requires artificial illumination, for it must be continued d and night. This is no disadvantage, but the contrary, as the other great practical difficulty is that of ascertaining the exact temperature and keeping it steady, the best pl for observation is a deep roomy vault or cellar.

The correction for the buoyancy of the air depends on th *specific gravity* of the pendulum; that arising from t dragged air, which we have called inertia, on its *form*. I is very desirable that the experiments should be made *vacuo*, and where that is difficult or impossible, as in a travelling apparatus, the law and quantity of the correction f each pendulum should have been previously experiment determined *in vacuo*. The variation for temperature shou be got from a comparison of summer and winter experiments at the same place. In addition to the height the place of observation above the sea-level, a rough survey should be taken of the form of the surrounding country, and of the kind of strata, with the specific gravity each. This is particularly necessary where the heights are considerable. (See Young's remarks, 'Phil. Trans.,' 1 p. 93.)

Still, when every known precaution has been taken, there are anomalies in the results of this experiment which a not yet clearly understood. It is very difficult to make t edge of the knife perfectly straight, and to keep it so wi it is fastened to the bar. There is considerable uncerta in measures of distance between the reciprocal kn edges; and lastly there is no authorised standard of leng at present existing in England in terms of which t distance can be expressed. The length of the sim pendulum which vibrates seconds in the latitude of L don is not at present known with the degree of certain which the importance of the problem demands, and wh is attainable.

Captain Kater proposed the following form of pen lum for determining the number of oscillations which same pendulum describes in different places, which is ne the same as Graham's above described. Mr. Baily pr the bar with two knife-edges, the same as that used determining the absolute length, and he directs obser tions to be made at each place with both knife-edges. T is certainly a great advantage in having a check upon t knife-edges, as a discrepancy between the two results posing the pendulum to have been previously

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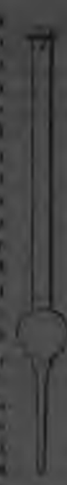
[*] This may be done two ways. Place the knife-edges A and B at the distance which will give the proper interval for coincidences, 39·4 inches for instance, A being at one end, and make the bar rather more than one-third longer; then the oscillations on B will be slower than those on A. By filing from the end C, these may be made to agree after two or three trials, or if the pendulum should be too short, a weight may be added at this end, such as is pointed out by the black dot near C.

[†] Mr. Baily uses two slips of gold-leaf pasted on a tail to his clock pendulum for a disc, which answers very well. In the experiments at Dolcoath mine, Messrs. Airy and Whewell had a disc of enamel at the end of a small rod, which was screwed into the bob and projected from it. The disc could be inclined so as to appear of the proper breadth and to receive an oblique illumination. This part of the experiment is almost irreproachable, but perhaps in uture it would be safer to place the clock and pendulum at greater distances rom each other, and to get sharp edges by interposing a lens.

[*] Captain Kater's measure was doubtful in several respects, and though been partially corrected, it is still uncertain. He expressed the length pendulum in terms of Sir George Schuckburgh's scale (which has suffered injury since that time), and this he found to be identical with liamentary measure declared to be standard by the 5 George IV. act of parliament standard was destroyed when the houses of parliame burned. Fortunately a very beautiful scale of 5 feet had been for the Astronomical Society, and three feet in this scale had been many hundred times with the parliamentary standard. As almost all scales and comparisons which have been made in England have been with this last-mentioned scale, it must be considered to be the standard, and the best evidence of the parliamentary standard wh The definition for restoring the yard, if lost, according to the act of that is, by the length of the seconds pendulum, as it depends upon an determination, would give a new standard, differing sensibly from the one which it was meant to preserve. (Baily's 'Report on a Standard *Astron. Soc. Mem.* vol. ix., p. 35.)



Kater's Invariable Pendulum.

lated) will show that one of the knife-edges has been injured. To ascertain which of the two it is, requires a second pendulum. Upon the whole, though we prefer Mr. Baily's pendulum to Captain Kater's, yet we think a form suggested by Mr. Airy is, for ordinary purposes, still better—that is, to have the knife-edge placed in that part of the bar where the oscillations take place in the shortest time. In this case it seems probable that any ordinary injury of the knife-edge will not alter the time of vibration. The observer must be very careful in these stiff bars to see that the pendulum is truly vertical, a precaution which in Kater's flexible bar is less necessary. If an observer chooses to have a second knife-edge opposite the former in the pendulum of minimum vibration, there is no objection except the increased resistance of the air, the increased correction for inertia, and the chance of confounding the two positions. The mere observation of the coincidences, which in its present form was first introduced by Kater, is so simple that it will be successfully performed by any person the first time of attempting it; and an error of a second or two in noting the moment is a matter of little importance. There is far greater latitude for error in noting the temperature and ascertaining the clock-rate, but there is another anomaly attending the knife-edge pendulums, only partially understood at present, which is much more vexatious than temperature or clock-rate. As the pendulum swings about those points of the knife-edge which are in contact with the agate planes, it is clear that, supposing any imperfection in both, those points may be altered, when the axis of suspension, and consequently the time of oscillation, will be altered too. Hence it is advisable to place the knife-edge as exactly as possible always in the same position on the agate plane, both as to front and back, and also as to right and left. It will generally be found that turning the pendulum half round on the same knife-edge will alter its time of vibration sensibly, so that the face in front must always be registered. But even when these precautions are taken, anomalies are still found, which we can only attribute to the following cause:—In most of the pendulums hitherto made the steel knife-edge has been fixed upon a bar of different metal (brass and copper) with stout brass knees, and the two screws which fix the steel knife-edge to the brass knees are at some distance from each other. Now if, from the difference of expansion between the brass knees and the knife-edge, the latter should be curved, not upwards or downwards, but in a horizontal plane, the consequent alteration of time in the oscillation may be very considerable. The steel edge therefore should either be controlled by being ground on a narrow slip let into a brass wedge, or the attaching knees should also be of steel. The uncertainty which appears due to some such cause as that above described may amount to one, two, or even more seconds a day in the invariable pendulum, either of Kater's or Baily's construction. It is evident that in measuring the actual length of the pendulum this error may be further increased, for the problem assumes the perfect parallelism and truth of a pair of knife-edges. For an account of knife-edge bar pendulums, see 'Kater's *Convertible* Pendulum, with Young's Appendix,' *Phil. Trans.*, 1818, p. 33; 'Kater's *Invariable* Pendulum,' *Phil. Trans.*, 1819, p. 337; Sabine's 'Experiments to determine the Figure of the Earth,' London, 1825; Sabine's 'Comparison of the Length of Pendulum at London and Greenwich,' *Phil. Trans.*, 1829, p. 83; Sabine, 'On the Reduction to a Vacuum,' *Phil. Trans.*, 1829, p. 207; Baily, 'On the Reduction to a Vacuum,' *Phil. Trans.*, 1832, p. 399; Foster's 'Pendulum Experiments, edited by Mr. Baily,' *Mem. Ast. Soc.*, vol. vii. (at page 96, is given a table of the results of the most accurate modern pendulum experiments).

The last important measurement of the length of the pendulum, which is undoubtedly the most satisfactory, is due to Bessel, and is described by him in his 'Untersuchungen über die Länge des einfachen Secundenpendels,' Berlin, 1828, which forms part of the 'Transactions of the Academy of Berlin.' The principle of his measure is the same as Whitehurst's. Bessel procured from Paris a verified copy of the toise of Peru; this he placed upright, and suspended his ball and wire first from the top and then from the bottom of the toise, the ball being in both cases at the same point below; the time of oscillation in each position was compared with a clock in front. From the differences of the times of oscillation of these two pendulums, and the difference in their length, which is a toise, the length of the seconds pendulum was computed in parts of the toise. Bessel suspended his pendulum by passing a flat and very slender spring over a small cylinder, the spring being continued downwards to the ball in a fine wire. We must refer to the original memoir for a description of the different elaborate contrivances which were introduced by Bessel and Repsold for securing accuracy in every part of the process. All conceivable causes of error are considered, and the effects have been computed and allowed for. The final result is that the length of the seconds pendulum at the sea-level in the latitude of Königsberg, 54° 43′ N., is 440·8179 lines of the toise of Peru; this we consider to be a measurement of the actual length of the pendulum which is deserving of full confidence, and perhaps the only one.

We have already pointed out the manner in which experiments with the pendulum are used to determine the figure of the earth, and stated that for this purpose the simple bar with a knife-edge at the point of minimum oscillation seems the most fit. If the present imperfections can be overcome, which we see no reason to despair of, there is another research, that of the mean density of the earth, for which such an instrument is peculiarly adapted. The density which has been hitherto [illegible], depends on the attraction of Schehallien upon a plumb-line, observed by Maskelyne, and upon the attraction of leaden balls measured by a torsion balance, according to Cavendish, and more recently by Reich. Now in the Schehallien experiment the whole deflection caused by the mountain was only 11″·6, which, under the circumstances, might very easily be 2″ or even 3″ wrong either way. The Cavendish experiment is repeating in this country, but up to the present time the results give very moderate hopes of ultimate success.

If an invariable pendulum can be made which is only affected by known causes of which the effects can be calculated, the simplicity and perfection of the observation by coincidences, and the unlimited time for which it can be carried on, will supply a much broader and more secure base for the solution of this important problem, and one more readily and universally applicable. Two attempts were made by Messrs. Airy and Whewell, first by themselves, in 1826, and afterwards, in 1828, with the assistance of three Cambridge friends, to deduce the mean density of the earth from observing the oscillations of detached pendulums at the top and bottom of Dolcoath Mine, one of the deepest in Cornwall. As the first operation was less carefully planned, we shall confine our account to the second, which was altogether the best arranged pendulum experiment which has come to our knowledge, and only failed from a cause then first discovered, viz. that invariable pendulums of Kater's construction are very uncertain and inaccurate instruments. We will call the two pendulums 1 and 2. These were placed on their stands opposite each other, and put into motion at the same arc (a board being interposed to prevent their reciprocal action through pulses of the air), and the times of coincidences observed. A few series were thus made, in which the errors of observation scarcely amounted to a hundredth of a second per day.* Pendulum 1 was then sent to the bottom of the mine, and set up with its clock and proper accompaniments. Pendulum 2 was established with its clock in a hut at the surface. We will call the observers A, B, C, D, E. A set off at six in the morning, commenced a series with pendulum 2, and compared eight pocket chronometers with the clock by coincident beats through a sidereal half-seconds chronometer.† He then descended the mine and commenced a series, compared his chronometers below exactly as he had done above, and then sent them back to the upper station. By this time E had arrived at the upper station to finish the series which A had begun, and to compare the chronometers on their return. In this way the clocks were compared, without a possible error of $\frac{1}{50}$th of a second. After finishing his first series and commencing a second, A returned to day (in the miner's language, to *grass**). This series was completed by B, who set off at 2 P.M., made a third shorter series, and commenced a fourth. The night-work was taken by C or D, one of whom descended at 10 P.M., finished B's series, and commenced a fresh one; on his return to day he finished the upper series which E commenced before going to bed, and started another, which was finished by A before his next descent. In this way observations were continued from Monday morning, July 11, to Saturday afternoon (127 hours). On comparing the results of each day, it was found that the three first days agreed extremely well, showing an acceleration of about 2^s per day in the lower pendulum; but the two next days, this acceleration was about double. The only mode of accounting for this unexpected and very unwelcome result was, that the knife-edges and agate planes were imperfect, and that the time of oscillation depended on the position of the pendulum on its plane. This had never been suspected before; for confidence in the accuracy of the pendulum was at that time almost an article of faith among experimentalists. To ascertain this, a second series of comparisons was made between pendulum 1 and 2, taking care to place the knife-edges exactly in the same position on their planes, and that the faces were turned the same way. These comparisons were necessarily hurried, as a slip had taken place in the mine near the engine-shaft, which deranged the action of the pumps, and forced the experimenters to repeat their operations below without delay. Pendulum 1 was again sent below, and the experiment repeated exactly as described above, for three days (79 hours), until the underground observers were driven out by the water. Notwithstanding all the precautions which had been taken,† the observations of the last day gave a different result from the two first. 'The conclusion therefore on which the experimenters were unavoidably forced was, that even with the care and attention they had used, the pendulum could not be trusted.' The pendulums were a third time compared with each other above ground, and the intervals of coincidence were found to vary, without any assignable cause, from $20^m\ 24^s$ to $20^m\ 17^s$, and back again from $20^m\ 20^s$ to $20^m\ 29^s$; and finally, *during one series of oscillation, without being touched, or any one entering the room*, the time of coincidence changed from $20^m\ 25^s$ to $20^m\ 13^s$, and at last to $20^m\ 3^s$. It was therefore clear that while the mode of observing was perhaps sufficient to detect a difference of a hundredth of a second a day (except from the effects of temperature, which might amount to a tenth of a second), the pendulums themselves, though used with the utmost skill and precaution, and *under the same circumstances*, were liable to errors of two seconds or more per day.

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* In a series of six hours, the first and last coincidences could be so observed as not to admit an error of more than 2ˢ for the whole interval, and the coincidences followed each other in about 10 minutes. A bright strip was [illegible] on each edge of the tail of the [illegible] and [illegible] pendulums, and this was [illegible] by a lens placed obliquely. The corrections for arc, thermometer, barometer were the same for each. The time was taken from an excellent chronometer.

† The comparison of a single chronometer was generally sure to within $\frac{1}{100}$th of a second, generally within $\frac{1}{50}$th. The ½ seconds sidereal chronometer was compared first and last with the pendulum clock, giving nearly coincidences, and in the interval [illegible] coincidences of each pocket chronometer (which [illegible]) were observed with the sidereal chronometer.

PENE'LOPE (Ornithology). [CRACIDÆ, vol. viii., p. 130.]

PENE'ROPLIS, De Montfort's name for a genus of microscopic *Foraminifera*.

PENEUS. [THESSALY.]

PENGUINS, *Manchots* of the French, a group of natatorial birds, in which the wing, powerless as an organ of flight, is reduced to a mere rudiment as far as feathers are concerned; but it well assists the bird as a species of fin in its rapid divings and evolutions under water, and even as a kind of anterior extremity when progressing on the land. They seem to be among the *Natatores* what the *Struthionidæ* are among the strictly terrestrial birds.

Prodigiously active in the water, but helpless on the land, their lot has been wisely cast on those desolate southern islands and shores where man rarely intrudes, and in many instances where a churlish climate or a barren soil offers no temptations to him to invade their territory. They seem to occupy in the southern hemisphere the place filled by the Auks in the northern portion of the globe.

Before we enter into the details of the organization of these birds, or an inquiry as to the views of Ornithologists relative to their proper place in the system, it will be necessary to notice the various accounts of the habits of this very curious and interesting group. Le Vaillant, in pursuing his investigations on Dassen Island, where was the tomb of the Danish sea-captain, as noticed in the article PELECANIDÆ, found that the smaller crevices of the rocks served as places of retreat for *Penguins* (*Spheniscus*, probably), which swarmed there above every other kind. 'This bird,' says Le Vaillant, 'which is about two feet in length, does not carry its body in the same manner as others: it stands perpendicularly on its two feet, which gives it an air of gravity, so much the more ridiculous, as its wings, which have no feathers, hang carelessly down on each side: it never uses them but in swimming. As we advanced towards the middle of the island, we met innumerable troops of them. Standing firm and erect on their legs, these animals never deranged themselves in the least to let us pass; they more particularly surrounded the mausoleum, and seemed as if determined to prevent us from approaching it. All the environs were entirely beset with them. Nature had done more for the plain tomb of the poor Danish captain than what proceeds from the imagination of poets or the chisels of our artists. The hideous [illegible], however well sculptured in our churches, has not half so dead and melancholy an air as the penguin. The mournful cries of this animal, mixed with those of the sea-[illegible], impressed on my mind a kind of gloom which much disposed me to tender sensations of sadness. My eyes were for some time fixed on the last abode of the unfortunate traveller, and I gave his manes the tribute of a sigh.'

Sir John Narborough says of the *Patagonian Penguins*, that their erect attitude and bluish-black backks contrasted with their white bellies might cause them to be taken at a distance for young children with white bibs. The towns, *camps*, and *rookeries*, as they have been called, of these birds, have proved an ample theme for most of the southern voyagers. Those at the Falkland Islands have attracted particular attention. Some of these assemblies are described as giving a dreary, not to say awful impression of the desolation of the place and the utter absence of the human race. In some of the towns, it is stated, there was a general stillness, and when the intruders walked among the feathered population, to provide themselves with eggs, they were regarded with side-long glances, but they seemed to carry no terror with them. In many places the shores are covered with these birds, and three hundred have been taken within an hour; for they generally make no effort to escape, but stand quietly by whilst their companions are knocked down with sticks till it comes to their turn. Cook, speaking of the islands in the high latitudes of the South, describes the cold as intense; the islands were covered with hoar-frost and snow, neither trees nor shrubs appeared, and he saw no living creature except the shags and penguins, the last being so numerous that they seemed to encrust the rock.

Some describe the *rookeries* as designed with the utmost order and regularity, though they are the resort of several different species; a regular camp, often covering three or four acres, is laid out and levelled, and the ground disposed in squares for the nests, as accurately as if a surveyor had been employed: their marchings and countermarchings are said to remind the observer of the manœuvres of soldiers on parade. In the midst of this apparent order there appears to be, according to the same account, not very good government, for the stronger species steal the eggs of the weaker, if they are left unguarded, and the *King Penguin* (*Aptenodytes Patachonica*) is the greatest thief of all. Three species are stated to be found in the Falkland Islands; two of these, the *King* and the *Macaroni* (*Aptenodytes chrysocome*) deposit their eggs in the *rookeries*. The *Jackass* (*Aptenodytes demersa*), which is the third, obtaining its English name from the horrid brayings which it sets up at night, makes its nest in burrows on downs or sandy plains, and does not seem to take invasion so quietly as the other species. This, we conceive, must have been the penguin noticed by Forster, who describes the ground as everywhere so much bored that a person in walking often sinks up to the knees; and if the penguin chance to be in her hole, she revenges herself on the passenger by fastening on his legs, which she bites very hard.

But the dimensions of the *rookeries* above noticed sink into insignificance when compared with a settlement of

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* A miner divides the visible world into two parts, *underground* and *at grass*.

† A considerable difference was found in the temperature of the upper and lower part of the hut during the first upper ground experiment, from the heat of the lamp for illuminating the disc, which was kept continually burning. Before the second experiment, a side lobby was boarded off, in which the observer placed the illuminating lamp a minute or two before the coincidence took place. The lamp-light was thrown by a reflector on the disc through a hole in the boarding; and when the coincidence had been observed, the lamp was withdrawn and the hole stopped with flannel. The clock-face was illuminated for a short time before coincidence by a lamp with a powerful reflector through a hole in the front partition, which was also withdrawn and the hole stopped when the observer had caught the number of the beat. With these precautions, the temperature was perfectly steady, and sensibly the same at all altitudes and throughout the 24 hours.

King Penguins (Ap. Patachonica) recorded by Mr. G. Bennett, who saw at the north end of Macquarie Island, in the South Pacific Ocean, a colony of these birds which covered an extent of thirty or forty acres. He describes the number of Penguins collected together in this spot as immense; but observes that it would be almost impossible to guess at it with any near approach to truth, as, during the whole of the day and night, 30,000 or 40,000 are continually landing, and an equal number going to sea. 'They are arranged, when on shore, in as compact a manner and in as regular ranks as a regiment of soldiers; and are classed with the greatest order, the young birds being in one situation, the moulting birds in another, the sitting hens in a third, the clean birds in a fourth, &c.; and so strictly do birds in similar condition congregate, that should a bird that is moulting intrude itself among those which are clean, it is immediately ejected from them. The females hatch the eggs by keeping them close between their thighs; and if approached during the time of incubation, move away, carrying their eggs with them. At this time the male bird goes to sea and collects food for the female, which becomes very fat. After the young is hatched, both parents go to sea, and bring home food for it; it soon becomes so fat as scarcely to be able to walk, the old birds getting very thin. They sit quite upright in their roosting-places, and walk in the erect position until they arrive at the beach, when they throw themselves on their breasts, in order to encounter the very heavy sea met with at their landing-place.'

Mr. Bennett mentioned several instances of the appearance of Penguins at a considerable distance from any known land. They generally however indicate its neighbourhood. (*Zool. Proc.*, 1840.)

Captain Fitz-Roy gives the following interesting account of the mode in which penguins feed their young. The species on which he made his observations at Noir Island was probably the *Jackass Penguin*.

'Multitudes of Penguins were swarming together in some parts of the island, among the bushes and "tussac" (thick bushy grass) near the shore, having gone there for the purposes of moulting and rearing their young. They were very valiant in self-defence, and ran open-mouthed, by dozens, at any one who invaded their territory, little knowing how soon a stick would scatter them on the ground. The young were good eating, but the others proved to be black and tough when cooked. The manner in which they feed their young is curious and rather amusing. The old bird gets on a little eminence, and makes a great noise (between quacking and braying), holding its head up in the air, as if it were haranguing the penguinnery, while the young one stands close to it, but a little lower. The old bird, having continued its chatter for about a minute, puts its head down and opens its mouth widely, into which the young one thrusts its head, and then appears to suck from the throat of its mother for a minute or two, after which the clatter is repeated, and the young one is again fed; this continues for about ten minutes. I observed some which were moulting make the same noise, and then apparently swallow what they thus supplied themselves with; so in this way, I suppose, they are furnished with subsistence during the time they cannot seek it in the water.' (*Voyages of the Adventure and Beagle*, King.)

Mr. Darwin pleasantly relates his encounter with one of these birds on the Falkland Islands. 'One day,' says our voyager, 'having placed myself between a penguin (*Aptenodytes demersa*) and the water, I was much amused by watching its habits. It was a brave bird; and, till reaching the sea, it regularly fought and drove me backwards. Nothing less than heavy blows would have stopped him; every inch gained he firmly kept, standing close before me, erect and determined. When thus opposed, he continually rolled his head from side to side, in a very odd manner, as if the power of vision only lay in the anterior and basal part of each eye. This bird is commonly called the jackass penguin, from its habit, while on shore, of throwing its head backwards, and making a loud strange noise, very like the braying of that animal; but while at sea and undisturbed, its note is very deep and solemn, and is often heard in the night-time. In diving, its little plumeless wings are used as fins; but on the land, as front legs. When crawling (it may be said on four legs) through the tussocks, or on the side of a grassy cliff, it moved so very quickly that it might easily have been mistaken for a quadruped. When at sea, and fishing, it comes to the surface for the purpose of breathing, with such a spring, and dives again so instantaneously, that I defy any one at first sight to be sure that it is not a fish leaping for sport.' (*Voyages of the Adventure and Beagle*; Darwin, *Researches in Geology and Natural History*.)

Bougainville endeavoured to bring home a penguin alive; it became so far tame that it followed the person who fed it; it ate bread, flesh, or fish; but its fare appears to have been insufficient or inappropriate, for it fell away and died. We have sometimes thought that the *Four-footed Duck* of Gesner might have owed its origin to an ill-preserved penguin, and the notion of its being four-footed might have been fortified by some voyager who had seen the bird making progress as Mr. Darwin has above described. There is a larger figure than Gesner's, headed 'Cane à quatre pieds,' in the *Portraits d'Oyseaux*. Both are evidently much indebted to the imagination of the artist.

Organization.

An elaborate dissection of an adult male Patagonian Penguin, *Aptenodytes Patachonica*, Forst., the total length of which, measured over the back, was three feet two inches six lines, is given by Mr. Reid. The whole will well repay the reader for the time occupied in perusing it; but our limits will allow us to give little more than a portion of his description of the osseous parts. The specimen was captured at East Falkland Isle, lat. 51° 32′ south.

Mr. Reid describes the bones as very hard, compact, and heavy, having no apertures for the admission of air; but they contain, especially the bones of the extremities, a thin oily marrow. The *foramina* for the transmission of the blood-vessels of the bones are small. The *periosteum* is thick and fibrous. The *cranium* is short and broad, and is united into a single bone, with very little appearance of suture or harmony: superiorly, it is flattened; posteriorly, towards the *occiput*, it is rounded; it declines obliquely forwards, and when it attains the front of the orbits it is suddenly truncated to meet the superior mandible. The orbits are large, and separated only by membrane. Above each orbit there is a *fossa*, which is deeper and broader behind than in front, and which ends suddenly at its union with the orbitar process of the temporal bone. External and inferior to the termination of the transverse ridge of the occipital bone there is a process. The temporal bone has two processes; the tympanic, situated immediately anterior to the last-named process; and the orbitar, situated immediately behind the posterior part of the orbit. The basilar process of the occipital bone is short, ending posteriorly in a single round prominent condyle, which articulates with the *atlas*. The body of the sphenoid is lengthened, and its pterygoid processes form separate bones. The tympanic bones have the internal process much produced. The *jugum* is very long and thin, attached, as usual, to the tympanic and superior maxillary bones. The palatine bones are long and thin, meeting posteriorly the pterygoid, and anteriorly the superior maxillary bones.

The upper jaw is immoveable; the superior mandible long, slender, and a little arched at the point. The apertures for the nostrils are long and narrow. The bones of the superior mandible are of the usual form. The superciliary bones are wanting. The lachrymal bones are small, and fixed to the *os frontis*. The turbinated *laminæ* are small, soft, and cartilaginous.

The lower jaw is long and slender, and composed of three pieces, viz. the body of the bone and its two articulating portions. The coronoid processes are very small. The condyloid process is not elevated above the body of the bone. There is a process produced posteriorly for the attachment of the pterygoid muscles.

The *os hyoides* has the lateral *cornua* much lengthened, passing upwards posteriorly to the occipital bone, then curved forwards for a short distance upon the temporal bone.

The vertebral column consists of—

Cervical *vertebræ*	13
Dorsal	9
Sacral	12
Caudal	8
In all	43

The ribs are nine in number, and of the usual form; the two upper ones are not connected with the *sternum*. The oblique processes are situated halfway between their vertebral and sternal extremities. They commence cartilaginous at the inferior margin of each rib, and are about five lines broad at their origin; towards their termination they spread laterally to the width of one inch. As they approach the lower rib they get gradually thinner. In the first and last rib they are totally wanting. The last rib, at its centre, has a surface concave externally, produced by the action of the thigh. The sterno-costal bones are seven in number; the last one curved suddenly at its costal end. The body of the *sternum* is long. The keel is much developed at its top, and forms a very acute angle posteriorly, terminated by a small line. The space for the attachment of the middle pectoral muscle is considerably larger than that for the attachment of the great pectoral. On each side of the keel there is a large space, terminating inferiorly in one, owing to the shortness of the middle layer compared with the lateral ones. The keel terminates abruptly inferiorly. The ensiform process has a ridge in the middle, along which and the inferior edge of the keel a membrane was attached (which separated in maceration). The external layers of the bone are, as has been already incidentally noticed, much longer than the middle one; they curve inwards toward each other, and are tipped with cartilage. The sternal *fossa* is large and very distinct The sternal *apophyses* are very large. The coracoid bones are long, strongly formed, and smooth anteriorly; the margin much produced at the superior internal edge, and the ends furnished with long hamuliform processes, extending upwards and downwards. The superior one is attached to the clavicle by the intervention of ligament The upper part of the *os coracoides* is bent upon itself at an angle greater than a right angle. They are larger at their inferior ends, the inner ends being produced and curved forwards. The glenoid cavity of the bone is situated on the exterior posterior part, and is formed by this bone and the *scapula*, about three-fifths of the cavity being formed by the *os coracoides*. Each clavicle is turned downwards, and is broader near the coracoid bone, and tapering to the front, where there is a protuberance formed by the junction of the clavicles: this protuberance does not touch the *sternum*. Posteriorly they give off a flat conical process, which goes down internally to the coracoid bone, and is united to the process situated on the posterior part of the *scapula*, immediately inferior to its head. The *scapula* is remarkably broad and thin; its neck and head rounded. There are three articulating processes in this bone: one with the *furculum*; another with the coracoid bone: and the third with the *humerus*. On comparing the *sternum* and adjacent bones with the *sterna* of some nearly-allied *Birds*, less development of the keel is found in the *Loon*, and less development of the lateral wings in the *Auk*, and more in the *Spheniscus*. The differences are shown by tables given in Mr. Reid's paper.

The *humerus* is much flattened. On its posterior aspect there is a large *foramen*, situated under and occupying the whole of the internal part of its head, which is in form crescentic from before backwards: over the internal and posterior part of it a groove passes. The distal end of the bone has two tubercles for articulation. There are two prominent *trochleæ* on its posterior surface, on which work the two sesamoid bones of the elbow-joint. The form of the larger of these is flattened, and of the smaller trapezoid, with truncated edges.

The *ulna* is very thin and flat, not quite so long as the *humerus*, rounded slightly at its upper extremity, and still less at its lower one. Its head has a cavity, which receives the posterior tubercle of the *humerus*. Immediately inferior to this is a prominence on the posterior margin, to which is attached the ligament of the two sesamoid bones. The superior ulno-radial joint admits of little motion, being composed of a convex and plane surface. Near the distal extremity of the bone there are several rough lines for the attachment of muscles. The distal articulating surfaces are three: one with the *radius* anteriorly, another with the first carpal bone inferiorly, and the third with the second carpal bone posteriorly and obliquely downwards.

The *radius* much resembles the *ulna* in shape. At its head it has two articulations: one superiorly, with the anterior tubercle of the *humerus*; and the other posteriorly, for articulation with the *ulna*. There are likewise two articulations at its distal extremity: posteriorly one for the *ulna*; and inferiorly there is another with the first carpal bone Near its neck is situated a process for the attachment of muscles. On its superior anterior part a groove runs obliquely, from before backwards, and from above downwards. At the distal extremity there is a similar one but running in a contrary direction, that is, from behind forwards.

The first carpal bone has the form of a trapezium, with three articulating surfaces: a superior one for the *radius*; a posterior one for the *ulna*; and an inferior one for the *metacarpus*. The shape of the second carpal bone is triangular, with articulating processes, and a notch on its inferior edge; one anteriorly for the *ulna*, the other inferiorly for the *metacarpus*.

The *metacarpus* is composed of a single bone, formed by the union of two. The anterior of the two metacarpal bones supports two *phalanges* of the first finger, and is twice the size of the posterior one, which supports the single *phalanx* of the second finger. The upper end is crescentic, articulated with the first carpal bone anteriorly, and with the second inferiorly. There is a *sulcus* between the ends of the two bones, at their inferior extremity.

The first *phalanx* of the first finger is a long, broad, and flat bone, tapering gradually from above downwards, united to the *metacarpus* by a flat surface, and connected with the second *phalanx* by a similar articulation. The other *phalanx* is broad and flat, tapering from above downwards. By a similar articulation is attached to the posterior metacarpal bone a *phalanx*, which is flat, long, and tapering from above downwards, superiorly giving off a process which passes upwards for a short distance on the posterior part of the metacarpal bone.

The bones of the *pelvis* are so much shortened behind that they throw the centre of gravity in a perpendicular line with the *vertebræ*. The length of the *ilia* behind the cotyloid cavity is one-third of the length of the body in a *Gull* (*Larus*), one half in the *Loon*, and not quite one-fourth of the length of the trunk in the *Patagonian Penguin*. The sacro-sciatic notch is a complete *foramen*. The pubic bones are long and feeble; they are turned forwards and tipped with cartilage. The cotyloid cavity is a perfect *foramen*, with a large process at its postero-inferior part tipped with cartilage, and articulated with the *trochanter major*. The thyroid *foramen* is not complete, except by the intervention of a ligament which separates it from the *obturator foramen*. As there is no *iliacus internus*, the superior part of the *ilium* extends upwards, and lies close to the ribs.

The *os femoris* is formed as usual, the head being flattened anteriorly, the neck short and thick, the *trochanter major* smooth on its superior posterior surface, and articulated with the process on the *ilium*. Besides the posterior there is also an anterior *linea aspera*. There is a process external to the external condyle, having its inferior surface tipped with cartilage, which acts as a pulley. On its [illegible] external surface there is a sharp edge. The condyles are not much everted.

The shape of the *patella* is peculiar. There are two articulating surfaces posteriorly: one which would form part a large crescent, and which has a prominence for the condyles of the *femur* in its centre; the other, inferior, is likewise crescentic; it is very narrow, and articulated by ligaments to the tubercle of the *tibia*.

The superior surface of the *femur* has a *crista* in its centre, of an ovoid form; the posterior edge truncated. The internal surface is perfectly flat; the oblique slightly marked with a ridge, and looks downwards. There is a groove on the centre of the anterior edge, which also passes obliquely downwards on the external side: these two sides are truncated at their junction.

The *tibia* is nearly twice the length of the *femur*; [illegible] tubercle is elevated above its head, and forms a [illegible] short conical truncated process. On the anterior part the head there is a large groove, deepest at the top, and passing obliquely downwards and inwards; the outer side is here smooth, for articulation with the *fibula*. It has inferiorly two condyles, articulated with the *metatarsus*, having a *foramen* above and between them for the transmission [illegible] tendon, &c.

The *fibula* is in the form of a lengthened cone, and attached to the outer surface of the *tibia*; for about two-thirds of its length it is anchylosed to that bone in[illegible]. It has the usual quantity of surfaces for the attach[illegible] muscles.

There is no *tarsus*.

The *metatarsus* has two articular depressions on it[illegible] terior surface, for the reception of the condyles of the *tibia*. It represents three pulleys for articulation with the *phalanges*. On the inner part of the superior face is situated the metatarsal bone of the first toe, connected by ligaments to the large bone. There is a *fossa* on the superior surface, between the first and second and second and third bones of the *metatarsus*; this gradually decreases in size and increases in depth, till it perforates the bone, and joins the *fossa* on its inferior surface, where, immediately anterior, internal, and inferiorly to the outer depression on its head, there is a large protuberance, forming the inner boundary to a groove. The phalangeal end is formed as in most *Birds*. The first toe, which is the smallest in the foot, has three bones, all of which are flattened, and have simple articulations, the last one having a nail. The metatarsal bone is only connected to the others by muscle; the whole length of the toe is one inch; the second toe has three *phalanges*, the third has four, and there are five belonging to the fourth toe. All are formed as is usual in this class.

The ligaments of the head and trunk are of the usual form.

In addition to these, a ligament arises from the sesamoid bones of the elbow joint, which passes to the external or dorsal side of the *carpus*, where it is tied down; it again passes forwards, and is attached by separate slips to the joint and head of the first part of the *metacarpus* and to the first *phalanx* of the first finger, and is inserted into the second about three lines from its head. The ligaments of the hip-joint are as usual. Besides the usual ligaments of the knee-joint, there is one which arises together with the crucial, and is attached to the *patella*, half way down the central line. The form of the semilunar cartilages is crescentic, with prolonged horns. The ankle-joint has semilunar cartilages of the usual form. There are superior and inferior annular ligaments belonging to the *metatarsus*. In no other instance is there any deviation from the usual form.

There is a very large *bursa* situated within the knee-joint.

The muscles were of a dark red colour, very tough, and having a great deal of cellular membrane amongst them. The *fasciæ* were very thick and strong. In no instance did Mr. Reid observe any tendency to ossification in the tendons. In the tendons of the *perforatus* of the first and second toes there was a sesamoid bone, scarcely equalling in size a mustard seed. (*Zool. Proc.*, 1835.)

The sensations of these curious birds do not seem to be very acute. Sparrman relates that he stumbled over a sleeping one and kicked it some yards without disturbing its rest; and Forster states that he left a number of them apparently lifeless, while he went in pursuit of others; but they afterwards got up and marched off with their usual gravity.

ARRANGEMENT, &c.

Mr. Vigors enters the family of *Alcadæ* by means of the genus *Uria* (GUILLEMOTS), which it contains, as well as *Alca* and *Aptenodytes* of Gmelin. "The latter genus," says Mr. Vigors, 'apparently carries to the extreme the typical character of those groups in which the wings, becoming gradually shorter, and less furnished with feathers, lose at length all their powers of flight, and assume the functions of fins instead of wings, to assist the bird in its progress through the water. The whole of the family before us, united by the form of the foot, is separated into generic groups by the different shape of the bill. And here a beautifully progressive series of affinities is apparent, throughout the whole group. Beginning from the true *Aptenodytes*, we may observe that the bill of that genus is long, rather slender, and somewhat curved; while that of *Catarractes*, Briss., which succeeds, is shorter and more elevated at the ridge; thus leading the way to *Spheniscus*, Briss., where the sides are compressed, and the culmen elevated into a sharp ridge. This structure approaches the form of the same member in the true *Alca* [AUK], in which the sides are still more strongly compressed, and the culmen more elevated. The *Fratercula*, Briss., the well known Puffin of our rocky coasts, following *Alca*, exhibits the extreme of this singular construction; and there cannot be a more interesting subject of contemplation to him who may wish to witness the mode in which nature harmonises her groups, than the gradual change of form that unites the short and elevated bill of this last genus with the long and slender bill of *Aptenodytes*. A similar gradation of affinities between conterminous groups leads us back again to the point from whence we started. Some species of the Linnean *Alca*, which M. Temminck has united under the generic title of *Phaleris*, with bills less elevated at the culmen and more tapering than that of *Fratercula*, lead us gradually to the *Mergulus* of Ray, the *Little Auk* of our volumes. This genus strongly and distinctively separated from both *Alca* and *Uria*, in the former of which groups it has been placed by Linnæus, and in the latter by M. Temminck, may be considered as intermediate between them. It thus brings us to *Uria*, where the pointed and tapering bill, again discernible, reconducts us to *Aptenodytes*." Mr. Vigors, having thus observed that the groups composing the *Alcadæ* are characterised by having no hind toe, passes from them to the *Pelecanidæ* by means of *Aptenodytes*. [PELECANIDÆ.]

Head of Aptenodytes.

Mr. Swainson observes that the hind toe in the penguins and cormorants is placed almost as forward as in the swifts. In the penguin, the tarsus is so short as almost to be confounded with the sole of the foot; and it is probably rested upon the ground for its whole length when the bird walks, just as in the bear and other plantigrade quadrupeds; it is also, he adds, remarkably broad; the hind toe is placed in front, and on the inner margin; but it is so unusually small, that, but for its short but well defined claw, it would not be perceived. This claw is without any vestige of a web, or of a lobe, and is quite disconnected from the others; of the three anterior toes, the middle is the longest, the outer rather less, and the inner the shortest. The whole foot is remarkably flattened, as if to enable the bird to cover a greater breadth of ground. (*Classification of Birds*, vol. i.)

Foot of Aptenodytes.

In the second volume of the same work, the author, after a summary discussion of the family *Alcadæ*, considers the penguins, on the whole, as the most singular of all aquatic birds, and he states that they clearly point out that nature is about to pass from the birds to the fishes.

We own that this is not quite so clear to us. Among the terrestrial birds we regard the *Struthionidæ* as presenting the most erpetoid form; and an examination of the organization of the penguins leads us to the conclusion that they more satisfactorily represent some of the aquatic reptiles, especially the marine *Testudinata*. M. Lesson thinks that *Apt. Pachyrhynchus* leads to the mammifers by *Ornithorhynchus*. The *Alcadæ* of Mr. Swainson consist of the genera *Uria*, *Alca*, *Mormon*, *Chimerina* (Eschl.), *Phaleris*, and *Aptenodytes*. The family is placed between the *Colymbidæ* and the *Pelecanidæ*.

According to Mr. G. R. Gray, the genera of the *Alcadæ* are subdivided into the subfamilies *Alcanæ*, *Phalerinæ*, *Spheniscinæ*, and *Urianæ*.

The *Spheniscinæ* comprehend the genera *Spheniscus*, Briss.; *Eudyptes*, Vieill.; *Pygoscelis*, Wagler; and *Aptenodytes*, Forst. (*List of the Genera of Birds*, 1840.) Specimens of each of these genera are to be seen in the British Museum.

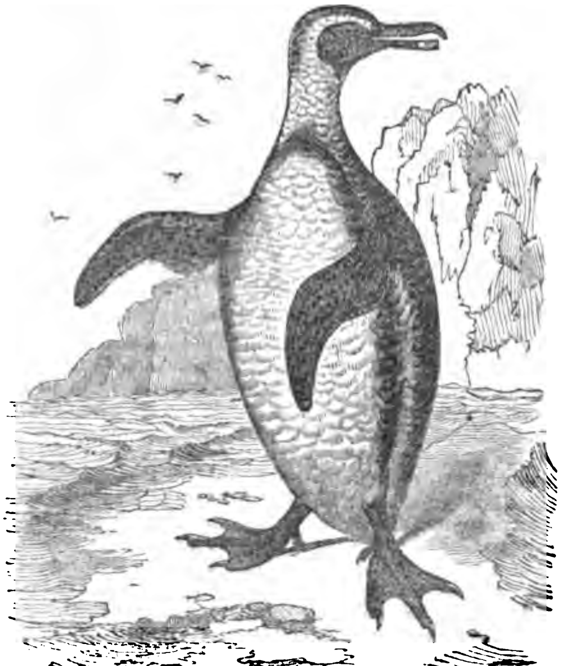
Spheniscus. (Briss.)

Generic Character.—Bill compressed, straight, irregularly furrowed at the base; end of the upper mandible hooked, that of the lower mandible truncated; *nostrils* median and exposed. Wings improper for flight.

Example, *Spheniscus demersus—Aptenodytes demersa*, Gm.

Description.—Bill and *feet* black; the former with a yellowish transverse band near the apex; eye brows and pectoral band white; body above black or black-speckled; white beneath.

Geographical Distribution.—The South Seas, Atlantic and Antarctic. In great abundance at the Falkland Islands and Cape of Good Hope.



Spheniscus demersus.

Eudyptes, Vieill. (Catarrhactes, Briss.)

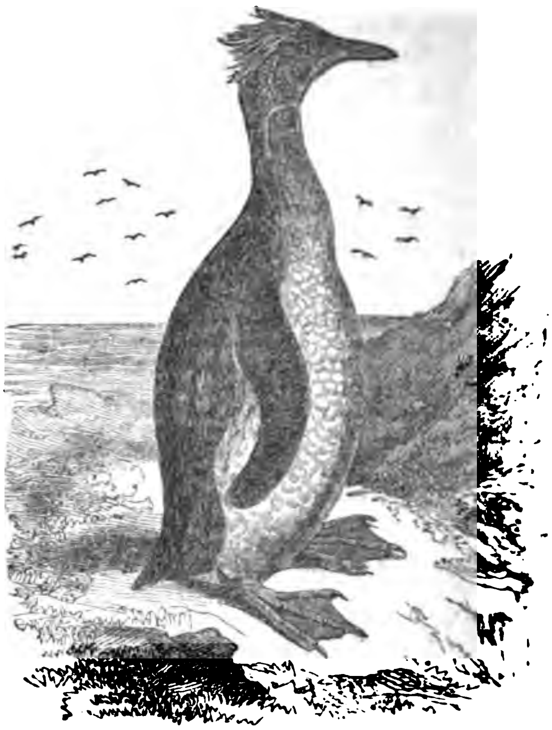
Generic Character.—Bill straight at the base, compressed, furrowed obliquely, pointed, rounded above, upper mandible hooked, lower mandible rounded or truncated at the point; a furrow originates from the nostril and terminates at the lower third of the border. *Wings* reduced to rudiments, improper for flight.

Example, *Eudyptes Chrysocome—Aptenodytes Chrysocome*, Gm.

Description.—Bill reddish-brown; frontal crest, consisting of very narrow loose feathers, black and erectile; auricular band deflected, sulphureous. *Body*, above bluish-black, below velvety-white; *wings* black above, white below; *feet* yellowish.

This is the *Crested Penguin* of Latham; *Manchot Sauteur* of Bougainville and Buffon.

M. Lesson has given a good account of its habits, as well as of those of others of the species, in the *Zoologie de la Coquille*. He states that it lives in all the seas of the southern hemisphere, far from the land; for he killed individuals in 43° 8′ 38″ S. lat. and 56° 56′ 49″ W. long., voyaging in couples, doubtless male and female.



Eudyptes Chrysocome.

Aptenodytes. (Forster.)

Generic Character.—Bill longer than the head, slender, straight, bent at the point: both mandibles equally pointed, rather obtuse; the upper mandible furrowed throughout its length; the lower mandible largest at the base, and covered with a naked smooth skin. *nostrils* linear, hidden by the frontal feathers. *Feet* short and stout; toes directed forwards, great toe very short. *Wings* featherless, reduced to rudiments or winglets covered with hairy feathers.

Example, *Aptenodytes Patachonica*.

Aptenodytes Patachonica.

Description.—Lower half of the demi-bill red; head and throat covered with very black feathers; a yellow orange band, widest towards the occiput, occupies each side, unite upon the breast, and separate the black of the throat from the grey-ash which covers the back; the feathers of the belly have the whiteness and lustre of satin, and a yellow tint more and more deepened mingles in it towards the upper part of the breast; two bands of deep black occupy the sides; toes strong and robust; wings more elongated than in the other penguins. Height, when erect, upwards of three feet.

Geographical Distribution.—Southern hemisphere in high latitudes. Straits of Magalhaens; Falkland Islands, Antarctic Islands, &c. Weddell (*Voyage to the South Pole*) gives a highly interesting account of the habits of this species.

The forms above given will, it is hoped, sufficiently explain to the student the group before us. The type of the genus *Pygoscelis* of Wagler is *Aptenodytes Papua* of Gmelin, an inhabitant of Papua, or New Guinea, among other localities.

PENICILLUS, a subdivision of the Linnæan genus *Corallina*. [illegible]

PENICILLUS, Bruguière's name for the Aspergillum of Lam. [ASPERGILLUM; TUBICOLIDÆ.]

PENITENTIARIES. [PRISONS.]

PENITENTS. [PENANCE.]

PENJAB, or **PANJAB**. [HINDUSTAN.]

PENKRIDGE. [STAFFORDSHIRE.]

PENMAEN MAWR. [CAERNARVONSHIRE.]

PENN, SIR WILLIAM, was born in 1621, at Bristol. Having entered into the sea-service, he was made a captain in 1642, and an admiral in 1653 for his services against the Dutch. He was one of those who commanded when Jamaica was taken from the Spaniards in 1655, in which year he returned to England, and was elected member of parliament for Weymouth, but was committed to the Tower by the republican government on the charge of having left his command without leave. After the Restoration he was created a knight, and was made a commissioner of the navy, governor of Kinsale, and a vice-admiral. He again went to sea in 1664, and was commander-in-chief under the duke of York, in the naval victory over the Dutch in 1665. In 1666 he retired from service at sea, but continued to perform his other duties till 1669, when he went into retirement at Wanstead in Essex, where he died in 1670.

PENN, WILLIAM, the only son of Admiral Penn, was born in London, October 14, 1644. He was educated with much care at Chigwell in Essex, and then at a private academy in London. In 1660, he was entered a gentleman commoner of Christ Church, Oxford. His first bias towards the doctrines of the Society of Friends, or Quakers, as they are commonly called, appears to have been produced by the preaching of Thomas Loe; the effect of which was, that, while at Oxford, Penn, together with some of his fellow-students, began to withdraw from attendance on the public worship of the established church, and to hold private prayer-meetings. They were fined by the college for nonconformity, but this did not deter them; for, an order from the king having required that the antient custom of wearing surplices should be revived, Penn and his associates attempted to tear them from the backs of those students who wore them. For this display of intemperate zeal they were expelled from the college.

Admiral Penn, who was in high favour with Charles II. and the duke of York, and ambitious for his son's advancement at court, was much displeased with this event, and still more with the change which had taken place in his son's manners. He tried to turn him from his religious observances and company, but in vain, and at length was so highly incensed as to have recourse to blows, and finally turned him out of doors. The admiral soon relented so far as to try another expedient. He sent him, in 1662, on a tour to France. After remaining a considerable time in Paris, Penn went to Saumur, and studied under the popular preacher Moses Amyrault. He afterwards proceeded to Turin, whence he was recalled by his father to England, in 1664, who, on his return, was greatly pleased with the polish and courtliness of manners which he had acquired. He was now admitted a student of Lincoln's Inn, where he continued till 1666, when his father sent him to Ireland, for the purpose of managing his estates in that country. This duty he performed to the entire satisfaction of his father; but, happening to attend a religious meeting at Cork, where Thomas Loe delivered a discourse, beginning 'There is a faith that overcomes the world, and there is a faith that is overcome by the world,' he was so deeply impressed, that from this time he constantly attended the Quakers' meetings. At one of these, held at Cork, in 1667, he and others were apprehended by order of the mayor, who would have set Penn at liberty on his giving bail for his good behaviour, but he refused, and was sent to prison with the rest. He wrote however to the earl of Orrery, then lord president of Munster, requiring the release of all, but the earl contented himself with ordering Penn alone to be set at liberty.

Admiral Penn, on being informed that William had decidedly joined the Quakers, summoned him home, and remonstrated with him and threatened him, but in vain: the son was firm, but respectful. The admiral at last restricted himself to the demand, that he should take off his hat in the presence of the king, the duke of York, and himself. But Penn refused to pay even this limited degree of 'hat worship,' at which the admiral was so much incensed that he again turned his son out of doors; but in a short time he allowed him to return home.

In 1668 Penn began to preach, and also published his first work, 'Truth exalted.' In this year a preacher named Vincent accused the Quakers of being opposed to the doctrine of the Trinity. A public disputation took place, from which both parties retired without being convinced. In prosecution of this controversy Penn wrote 'The Sandy Foundation shaken,' in which he professed his belief in the doctrine of the Trinity, but objected to the language in which it was expounded by the church of England; and for this he was committed to the Tower. During his imprisonment, which lasted nearly seven months, he wrote his 'No Cross, no Crown,' one of his most popular works. In 1669, after his liberation, an entire reconciliation took place between him and his father, and he again went to Ireland to look after his father's estates, in which country he remained about twelve months.

In 1670 the Conventicle Act was passed, and Penn was one of the first sufferers under it. He was committed to Newgate for preaching to what was called 'a riotous and seditious assembly,' which consisted of the Quakers, who had been excluded from their chapel, and who now met in the open street, as near to it as they could. The trial took place at the Old Bailey Sessions, and is remarkable not only for the firmness and ability of Penn's defence, but for the admirable courage and constancy with which the jury, in opposition to the direction of the Bench, and in defiance of its threats, pronounced a verdict of acquittal. The jury were fined, and ordered to be imprisoned till the fines were paid; but this proceeding was declared illegal by the Court of Common Pleas, on which occasion, chief-justice Vaughan delivered an able speech in defence of the rights of juries. Soon after this Admiral Penn died, perfectly reconciled to his son, to whom he left estates worth 1500*l*. a year. In February, 1670-1, Penn was again committed to Newgate on a charge of preaching publicly, and he remained in prison six months.

In 1672 Penn married Gulielma Maria, daughter of Sir William Springett, who was killed in the civil wars at the siege of Bamber. He now took up his abode at Rickmansworth in Hertfordshire, but afterwards settled at Worminghurst in Sussex.

In 1677, in company with George Fox and Robert Barclay, he made a sort of religious tour in Holland and Germany, and was received with marked distinction by the princess Elizabeth of the Rhine, daughter of the king of Bohemia, and granddaughter of James I. of England. After his return, he was heard before a committee of the House of Commons in behalf of the Quakers, who were oppressed by Exchequer prosecutions under statutes which had been enacted against the Roman Catholics; he was also admitted to plead before a committee of the house, that the solemn affirmation of the Quakers should be admitted in the place of an oath, and to this effect an enactment passed the Commons in 1678, but was lost, in consequence of a prorogation, before it had passed the Lords.

We now come to an important event in Penn's life, the establishment of the colony of Pennsylvania. A tract of country on the west side of the Delaware was granted on petition by Charles II. to Penn and his heirs, in consideration of a debt of 16,000*l*. due from the crown to Admiral Penn, for money advanced for the service of the navy. To this the duke of York added by cession a contiguous portion of territory lower down on the Delaware. The king's patent was dated March 4, 1680-1, and in this document he named the province, in honour of the founder and his father, Pennsylvania. Penn was constituted absolute proprietor and governor of the province. He published 'Some Account of Pennsylvania,' &c., and also 'Certain Conditions or Concessions, &c., in which he offered easy terms of settlement to those who might be disposed to emigrate. Three ships soon set sail with settlers from England and Wales, chiefly Quakers. In the beginning of 1682 he published 'The Frame of the Government of the Province of Pennsylvania in America, together with certain Laws agreed upon in England by the Governor and divers Freemen of the aforesaid Province, to be further explained and confirmed there by the first Provincial Council that shall be held.' Having previously opened a friendly intercourse with the native Americans by presents and conciliatory letters, in the autumn of 1682 he sailed for Pennsylvania, leaving his wife and children in England, and soon after his arrival summoned an assembly of the freemen of the province, by whom the frame of government, as formed in England, was accepted. He had sent out instructions, before he left England, to negotiate a treaty of sale with the Indian nations, and tradition records that a great meeting of the Indian nations and European settlers took place under an enormous elm-tree, near the site of Philadelphia, when the treaty was ratified, and a league of friendship established, 'a friendship,' says Proud, the historian of Pennsylvania, 'which, for the space of more than seventy years was never interrupted, or so long as the Quakers retained power in the government.' The exact date of this memorable assembly has not been specified.

Having founded the city of Philadelphia on the banks of the Delaware [PHILADELPHIA], and spent about two years in the province adjusting its political constitution, and bringing the colony into a state of prosperity and order, he returned to England about Midsummer, 1684. Within this short period no less than fifty sail arrived in the province with settlers from England, Ireland, Wales, Holland, and Germany.

In February, 1685, soon after Penn's return to England, Charles II. died, and the favour with which James II., when duke of York, had regarded Admiral Penn, was transferred to his son. After the Revolution in 1688, his intimacy with James II. exposed him to suspicions, and he was four times arrested on accusations of being a concealed Papist and a Jesuit; but he always cleared himself before the king and council, till one Fuller, who was afterwards declared by parliament to be an impostor, in 1690 accused him on oath of being concerned in a plot to restore the late king. Unwilling to expose himself to the risk of being convicted upon the oath of such a man, and the perjured evidence which he might get up, he lived in great seclusion in London till 1693, in which year, through the mediation of his friends at court, he was admitted to plead his cause before the king and council, and was honourably acquitted. Soon after this his wife died. In 1696 he married Hannah, the daughter of Thomas Callowhill, a merchant of Bristol.

In 1699 he again sailed for Pennsylvania, with his wife and family, with the intention of making it the place of his future residence. He had been deprived of the government of Pennsylvania in 1692, and it had been annexed to that of New York; but it was restored to him in 1694 by an instrument of William and Mary. An attempt was afterwards made to take possession of the proprietory governments in North America, and to convert them into regal ones. A bill for this purpose was already before the lords, when it was delayed by petition of the friends of Penn, who immediately embarked for England, where he arrived in December, 1701. The bill was dropped after his return, and the accession of Queen Anne once more restored him to favour at court. In the meantime Penn had become encumbered with debt. He had mortgaged Pennsylvania in 1708 for 6600*l*. In 1712 he agreed to sell his rights to the English government for 12,000*l*., but was unable to complete the transaction by three apoplectic fits which followed each other in rapid succession, and considerably impaired both his memory and understanding. He survived however in a tranquil state, though with his bodily and mental vigour gradually decaying, till the 30th of July, 1718, when he died, at his seat at Ruscombe in Berkshire.

Penn left children by both of his wives, and to them he bequeathed his property in Great Britain and America. The government and quit-rents of Pennsylvania devolved to the surviving sons of the second family, with the title of Proprietaries, and by them were sold to the state of Pennsylvania, after the American Revolution, for 130,000*l*.

Penn's writings, which are numerous, were collected, and published, with a Life prefixed to them, in 1728, 2 vols. folio.

(Clarkson's *Life of Penn*; Sewell's *History of the Quakers*; Proud's *History of Pennsylvania*.)

PENN-AIR. [HINDUSTAN, vol. xii., p. 208.]

PENNANT, THOMAS, was born of an antient Welsh family, at Downing in Flintshire, on the 14th of Jan., 1726. He was educated at Wrexham school and subsequently at Oxford, but took no degree in that university, though the honorary distinction of LL.D. was afterwards conferred on him. When about twelve years old he received a present of Willughby's 'Ornithology,' and he dated the commencement of that fondness for natural history which distinguished his future life from the perusal of this book. Immediately after leaving Oxford he made an excursion into Cornwall for the purpose of examining the mines and investigating the objects of natural history which that county possesses. His first literary production was an account of the shock of an earthquake felt at Downing in 1750, which was published in the 'Philosophical Transactions.' In 1756 a memoir appeared by Pennant in the same work, on certain coralloid bodies found in Shropshire; this attracted the attention of Linnæus, upon whose recommendation the author was elected a member of the Royal Society of Upsal, a distinction of which Pennant was always particularly proud.

In 1761 he commenced the publication of his first great work, the 'British Zoology,' which was printed in large folio, and when complete contained 132 plates. It afterwards went through many smaller editions, and received numerous additions. Latin and German translations with the plates were published abroad. The best copies of the work are those which came out in 4to. in 1776 and 1777, in 4 volumes. The 'British Zoology' included nearly the whole of the species of the animal kingdom (at that time known) inhabiting this island, with the exception of the class of insects, which was entirely omitted. In 1765, during the progress of this work, Pennant made a tour on the Continent, where he was introduced to some of the celebrated foreign naturalists. He visited Buffon at Montbard, and he afterwards maintained a correspondence with this great man. From France he proceeded to Switzerland, and at Berne became acquainted with Baron Haller. He then travelled through Germany and Holland, and formed an intimacy at the Hague with Pallas. Speaking of this naturalist, Pennant says, 'Our conversation rolled chiefly on natural history, and as we were both enthusiastic admirers of the great Ray, I proposed his undertaking a history of quadrupeds on the system of our illustrious countryman, a little reformed. He assented to my plan, and wrote me a long letter in which he sent an outline of his design, and his resolution to pursue it with all the expedition consistent with his other engagments.' Pallas went to Russia, and never accomplished this project, but Pennant followed up the idea himself, and in 1771 published a work with the title of a 'Synopsis of Quadrupeds,' illustrated with about thirty plates. This was intended as a sort of index to the species of animals described by Buffon in his great work on natural history; he gradually however extended its limits, and included in it the description of many animals which he had observed in different collections, or which had been discovered by different travellers, and were unknown to Buffon. He followed the arrangement which had been conceived by Ray, introducing however the genera established by Linnæus. The 'Synopsis,' when enlarged, was republished with the name of a 'History of Quadrupeds.' The descriptions in this work were short and meagre, and the synonymes few in number and not always correct; nevertheless it was very well received, for it was the first [illegible] work on quadrupeds in which they were methodically arranged, and it contained a number of new species and many original figures, which were correctly though not very elegantly drawn. It went through several editions, and Buffon availed himself of the matter contained in it for his supplements. Cuvier says of this work, 'that it is still indispensable to those who wish to study the history of quadrupeds.' After his return to England, Pennant commenced a work on 'Indian Zoology,' of which 15 folio plates were published, the expense of which was partly defrayed by Sir Joseph Banks: it was soon discontinued.

In 1769 he set out on a tour through Scotland, the northern part of which had at that time been little explored by the traveller or the naturalist. He kept a journal which he noted down all the objects of interest that he met with, and published it after his return, with plates illustrating the scenery, &c.; this work went through many editions. He made a second excursion into Scotland in 1772, of which he also published an account. He was accompanied in this tour by Dr. Lightfoot, who then collected a great part of the materials for his 'Flora Scotica,' in the preparation of which Mr. Pennant was of great assistance to him.

The next work which Pennant commenced was a systematic catalogue called the 'Genera of Birds;' this was intended to be similar in plan to the 'Synopsis of Quadrupeds,' but it was never completed. His last great work was his 'Arctic Zoology,' which appeared in three quarto volumes in 1784-85-87, and contained twenty-six plates. This (which was necessarily a compilation, as the author never visited the native haunts of the animals which he described) included an account of the northern coasts of Europe, Asia, and America, with their productions, taken from the writings of different travellers, and from the examination of specimens of different animals sent to the author or preserved in museums. Pennant received considerable assistance during the progress of this work from many foreign naturalists, among whom Pallas, Thunberg, Sparman, Müller, and Fabricius may be mentioned. The 'Arctic Zoology' acquired considerable reputation among naturalists, and was valuable from containing descriptions and figures of many animals and birds previously unknown. It is universally consulted and referred to by authors at the present day.

When in his sixty-seventh year, he planned an extensive work on the model of the preceding, which was to embrace an account of every country in the world, with their productions; he published two volumes of this, in 4to., entitled a 'View of Hindostan.' Two more were brought out by his son, after his decease, with the name of 'Outlines of the Globe,' which also include the description of India and the adjoining countries.

Pennant wrote, among several other works, a 'Journey from Chester to London,' a 'History of London,' and a 'Tour in Wales,' which contain much interesting matter on antiquities and natural history. He never followed any profession, but spent almost the whole of his life as a retired country gentleman at his seat of Downing, in the midst of his favourite pursuits. He enjoyed nearly uninterrupted health till within a few years of his death, which took place in 1798.

PENNATULA. [PENNATULARIA.]

PENNATULA'RIA, a family of Zoophyta. The Linnæan genus Pennatula included several species of compound Zoophyta, having an internal elongate axis. Lamarck divided them into seven genera, and constituted for them a grand section of the Polypiaria, under the title of *Polypi natantes*, or *Floating Corallines*. One of these genera is Encrinus, which belongs to a very different group of animals. (*Animaux sans Vertèbres*, tom. ii.) Cuvier, avoiding this great error, employs eight generic distinctions. (*Règne Animal*, 2nd ed., tom. iii., p. 317.)

Blainville (*Actinologie*, p. 512) places the family of Pennatularia in his class Zoophytaria, and employs six genera, of which five were instituted by Lamarck and one by Cuvier.

The following are the characters of the group, according to Blainville:—

Animals polypiform, provided with eight pinnated tentacula, more or less prominent, and regularly scattered on the surface of one part of the general substance. The form of the whole is determinate; the mass is composed of a central solid axis, surrounded by a fleshy substance (analogous to the bark of a tree), often very thick, and supported by calcareous aciculæ more or less numerous.

All or nearly all of these animals are unattached, and float in the waters of the sea. Some writers have conjectured that in their movements the numerous polypi of the mass obey a common will. Phosphorescence belongs to several in a living state.

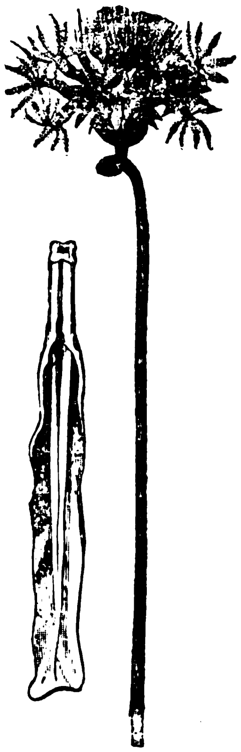
Whatever be the general form of the species of Pennatularia, one of the extremities is always devoid of polypi: in Pennatula this part may be compared to the tubular part of a feather, while the polypiferous portion resembles expanded barbs. There is therefore in these Polypiaria a bilateral symmetry which is not distinctly observed in other groups.

GENERA.

Umbellularia.

Animals polypiform, elongated, subcylindrical, provided with eight tentacula strongly pinnated, united into an umbel, in small number, at the end of a regular tetragonal cortical mass, which contains a long internal, tetragonal, calcareous axis.

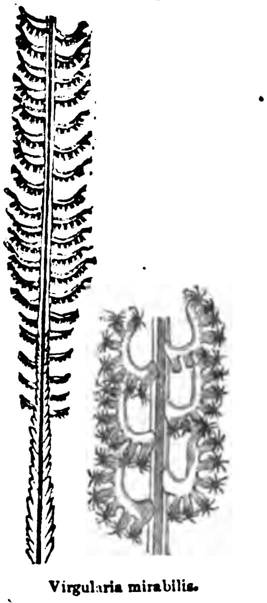
One species, the Vorticella encrinus of Ellis, figured in his work on the Corallines, p. 86, tab. 37, was found in the Greenland Seas; another (Umbellaria stellifera, Gmelin) is mentioned in Müller's 'Zoologia Danica,' p. 133, tab. 35. Example, *Umbellularia encrinus.*



Umbellularia encrinus.

Virgularia.

Animals polypiform, with eight ciliated tentacula, disposed in rows, on one edge of small oblique pinnules, which occupy the posterior extremity of a common cylindric almost linear mass, and are not spinous.



Virgularia mirabilis.

By this latter character, the arrangement of its pinnules, and the linearity of its rachis, Virgularia differs from Pennatula. It is not easy to say how many species are really known. Lamarck gives three, which Blainville adopts, but Cuvier reduces them to two. They are from European and Indian seas.

Example, *Virgularia mirabilis* (Pennatula mirabilis of Müller). Blainville, tab. 90, f. 5, 5 a.

Pavonaria.

Animals polypiform, sessile, not retractile, provided with eight pinnated tentacula, disposed in quincunx on one face of the retral half of a free, regular, elongated, quadrangular rachis.

A genus of Cuvier, adopted by Blainville. Both authors agree in referring to it two species described by Bohadsch and Pallas.

(There is extreme confusion of synonymy in the references to figures of Pennatularia, and particularly to Pennatula mirabilis, a term apparently given to different objects by Linnæus, Pallas, and Müller.)

Pennatula mirabilis of Linnæus is referred by Cuvier to his genus Scirpearia.

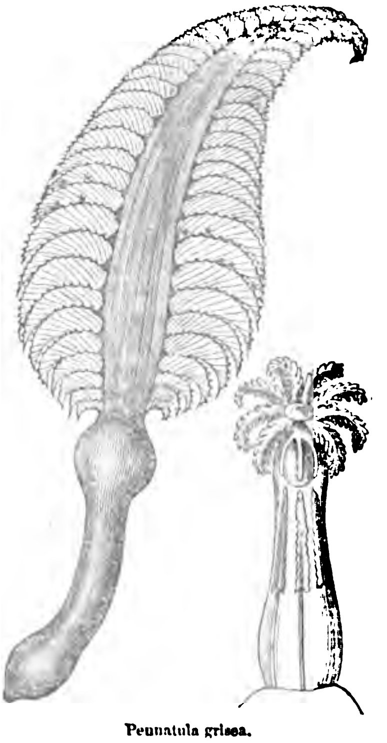
Pennatula.

Animals polypiform, provided with eight pectinated tentacula entirely retractile, and irregularly disposed on the retral edge of a sort of spears or lateral pinnules; these pinnules are symmetrically placed along the whole extent of a regular, symmetrical, spiculiferous rachis, and they are prolonged into a bulbiform expansion pierced by four terminal openings.

The general form is sufficiently that of an expanded feather to justify the name.

Blainville admits four species, all but one from European seas. M. Ehrenberg thinks there are five.

Example, *Pennatula grisea*, Gmelin. (Blainville's *Actinologie*, tab. 89, figs. 1, 16.)



Pennatula grisea.

Veretillum.

Animals polypiform, cylindrical, furnished with eight pinnated tentacula, and retractile into orifices scattered in the substance of a regular, cylindrical, obtuse, unbranched, mostly fleshy rachis, which is prolonged into a bulbiform expansion pierced with four terminal openings. The internal solid axis is very small.

Cuvier established the genus, and remarks that in the large polypi of Veretillum the prolongation of the intestine into the common stem is more easily followed than in other compound Zoophyta.

Cuvier gives three species; Lamarck and Blainville two. Veretillum cynomorium, a foot long and an inch in diameter, occurs in the Mediterranean, and is remarkable for the vividness of the light which it diffuses around.

Renilla.

Animals polypiform, provided with eight pinnated tentacula; rachis dilated from a cylindrical free pedicle into a broad reniform expansion, on one face of which the polypi are scattered.

Pallas states that Pennatula reniformis (Renilla Americana), the type of the genus, has only six tentacula; but Schweigger describes eight. There is another species (Renilla violacea), noticed by Quoy and Gaimard, from Australasia.

Some of the singular fossil bodies known to geologists since the days of Linnæus by the title of Graptolithus are supposed by Nillson, Dr. Beck, and others to belong to the family of Pennatularia.

PENNI, GIOVANNI FRANCESCO, called Il Fattore, was born at Florence, in 1488, and received the name Il Fattore, or the Steward, from his having been entrusted with the management of the domestic affairs of Raphael. He however soon became one of his principal assistants. Dr. Waagen is of opinion that Penni executed many parts of the cartoons at Hampton Court, especially those of the Death of Ananias, St. Paul and Barnabas at Lystra, and St. Paul preaching at Athens. Of Penni's own works, frescoes and very few oil paintings remain. His characteristics are said to have been facility of invention, graceful execution, and singular felicity in landscape. After the death of Raphael, Penni went to Naples, where his works would doubtless have contributed to improve the prevailing style, had he not been cut off in 1528, at the age of 4

PENNSYLVA'NIA, one of the United States of North America, and one of the most important in magnitude, population, and industry. It extends from 39° 43′ to 42° N. lat., and from 74° 50′ to 80° 30′ W. long. It is separated on the east from New York and New Jersey by the winding course of the Delaware river, which constitutes the boundary for 230 miles. On the north it borders on New York, which is separated from it by the parallel of 42°, with the exception of the most western part, where Pennsylvania passes north of that line and reaches to the shores of Lake Erie. This lake washes the boundary for about 39 miles. The western boundary runs along the meridian of 80° which separates it from Ohio and Virginia for 155 miles. The parallel of 39° 43′ constitutes its southern border for 260 miles, dividing it from Virginia and Maryland. Pennsylvania is divided from the state of Delaware by a curved line about 24 miles long. Its mean length from east to west is nearly 300 miles, and its mean width 158 miles. The surface is estimated to be 47,000 square miles, or about 3000 miles less than that of England.

Surface and Soil; Climate and Agricultural Productions.—The Appalachian Mountains cover more than one half of the surface of this state. Along the southern boundary-line, between Mercersburg on the east and Union the west, the width of these mountains hardly falls short of 100 miles. The ridges of which the mountain-system consists run in the general direction of the whole system, south-south-west and north-north-east. North of 41° N. lat. the eastern ridges turn to the east-north-east, and continue in that direction to the banks of the Delaware, and the western ranges continue in a north-north-east course to the northern boundary of the state. Thus it happens that between 41° and 42° N. lat. the two outer ridges of the mountains are 200 miles apart. This mountain region occupies the middle of the state, and to the south-east and north-west of it extend two hilly regions exhibiting different natural features. The south-eastern region is estimated to occupy a surface of 7869 square miles; whilst the mountain region covers 25,189, and the north-western 13, square miles.

I. *The South-Eastern Region* extends along the Delaware river as far north as Williamsburg (near 41° N. lat.), and along the boundary of Maryland as far west as Mercersburg in Franklin county. Its north-western border is formed by the eastern ridge of the mountains called the North Mountains or Blue Mountains. The surface rises gradually from the south-east to the north-west, and near the foot of the Blue Mountains attains an elevation of between 200 and feet above the sea. It is not level and flat, but a continual ascent and descent. About 15 miles from the Blue Mountains, the hills form a continuous ridge, which rises to a considerable height near the southern boundary, but farther east exhibits frequent depressions and appears only in broken ridges. This ridge, which is called the South Mountain, terminates on the banks of the Delaware at the mouth of the Lehigh river. The country along the Delaware has an undulating surface, rising in low and gentle swells. The soil of this tract is a sandy loam, not distinguished by fertility, but well cultivated on account of the ready market afforded by the navigable river and the city of Philadelphia. About 30 or 40 miles from the river, the hills rise higher and their sides are rather steep, but the soil improves considerably in fertility, especially in the vicinity of the South Mountain, which is perhaps the most fertile district in the state. The country between the South Mountain and the Blue Mountains is very little inferior in fertility, especially the district which extends between the Schuylkill and Susquehanna rivers and Cumberland Valley. Its surface is rather hilly than undulating.

The climate of this region resembles that of England, except that the changes are more sudden and greater, and the summers hotter and the winters colder, than in England. The mean annual temperature seems to vary between 51° and 53° according to the elevation of the country. According to meteorological observations continued for nine years, the mean annual temperature of Germantown, near Philadelphia, is 53° 37′ Fahr.; that of London is 50° 5′. The mean temperature of the winter in Germantown is 32° 23′, and in London 39° 8′; that of the spring in Germantown 50° 2′, and in London 51° 1′. In summer it rises in the first place to 71°, and in London to 61° 2′; in autumn it is 52° 8′ in Germantown, and 51° in London. During the greatest cold experienced in this period, the thermometer descended in Germantown to 10° Fahr., and during the greatest heat it rose to 95°. During the winter months there is a good deal of frost and snow. When the wind has blown for a time from the south-east, and suddenly turns to the north-east and north-west, a difference of temperature amounting to twenty degrees is not uncommon. Such changes occur also in summer, when a difference of from 20 to 30 degrees is frequently observed between the afternoon and the following morning, especially after storms of rain and thunder. The most agreeable months are April, May, the first half of June, September, and a part of October. Westerly, north-westerly, and south-westerly winds are by far the most frequent, and heavy gales are far from being rare. Rain is abundant all the year round. The mean annual fall is 36 inches. The greatest quantity falls in the summer months, from June to September, both included; in July it sometimes amounts to 8 or 9 inches.

In this region are cultivated the grains of England, with Indian corn and much buckwheat. Hemp, flax, tobacco, and esculent plants thrive very well. The orchards chiefly produce apples, peaches, and cherries; the other fruits are less cultivated. In some sheltered places there are extensive vineyards.

II. *The Mountain Region* presents a different aspect in the southern and in the northern districts. South of 41° N. lat. it consists of a succession of steep ridges and narrow valleys, but north of that line it extends in an elevated table-land, the greater portion of the surface being occupied by large tracts of level or hilly ground, while the mountain-ridges are far distant from each other and cover a comparatively small part of the surface.

Nearly in the middle of the mountain region runs the highest and widest of the ranges of which it is composed. This range is called the Allegheny mountains, a term which is often applied to the whole mountain-system of the Appalachians. In the southern districts of Pennsylvania it forms the watershed between the rivers which descend eastward to the Potomac and Susquehanna, and westward to the Ohio; but north of 41° N. lat., where it inclines to the north-east, the continuity is broken by the upper branches of the Susquehanna. The summit of this range is broad and nearly of equal elevation, being destitute of peaks. Its elevation above the sea, south of 41°, seems to vary between 2000 and 2400 or 2500 feet, and it stands on a base from 800 to 1000 feet high, and from 8 to 10 miles wide. East of the Allegheny mountains there are five or six other ridges running parallel to each other; they attain a much less elevation, hardly more than 1200 feet above the sea-level. The most eastern of these ridges, the Blue Mountains or North Mountains, seems to be the highest, and, at the Wind Gap, near Williamsburg on the Delaware, attains the elevation of 1200 feet. The valleys enclosed by these several ridges rise in elevation as they approach the Allegheny mountains, the most easterly being hardly more than 200 feet above the sea-level, whilst those immediately contiguous to the base of the Allegheny mountains are 800 feet. Both the ridges and the valleys are comparatively narrow, occupying on an average only three miles in width. The declivities of the ridges are steep and the valleys much depressed and deep. The mountain-region west of the Allegheny mountains, south of 41° N. lat., consists of two broad valleys and two mountain-ranges, the Laurel Hills and the Chestnut Ridge. The valleys are about 1000 feet above the sea-level, and the ranges attain nearly the elevation of the Allegheny mountains, probably 2000 feet above the sea-level. The soil of this region is in general poor and stony, though the valleys contain some alluvial tracts of great fertility, but of inconsiderable extent.

No meteorological observations have been made in this region. The winters are very cold and of long duration; the snow covers the ground for several months; the springs are wet, and the summers, though hot, of comparatively short duration. Indian corn does not ripen in most parts, and is only planted to be consumed before it gets ripe; wheat is only cultivated in sheltered places. The most common grains are rye and oats. Orchards are not numerous, but apples thrive very well. The vegetables generally raised are peas, parsnips, carrots, onions, shallots, potatoes, sweet potatoes, and cabbages. The uncultivated portion of this region, which comprehends perhaps nine-tenths of the whole, is chiefly covered with forests. On the higher parts of the ridges the mountains are covered with conifers, as pitch, spruce, and white pines and cedars. In many parts they attain the height of full-grown timber-trees, but in others, where the sides of the hills have been washed by heavy rains and the soil is stony and poor, they are only of scrubby growth. The most common trees in the valleys are oak and chestnut, and, where the soil is subject to inundation, sycamore. West of the Laurel Hills, the forests are mainly composed of the broad-leaved laurel, rhododendron, and magnolia acuminata, mixed with chestnut-trees and some oaks.

The table-land of Pennsylvania, or the mountain region north of 41° N. lat., consists, as already observed, of large plains and some ridges. The plains have usually a broken and sometimes a hilly surface, and are partly covered with trees. Some level plains are large swamps. The highest part of the table-land is contiguous to the boundary-line of New York, and rises to an elevation of between 1200 and 1500 feet. The few ridges with which it is over-topped are a few hundred feet higher. Along the watercourses the table-land is depressed, sometimes eleven hundred feet, and in these districts wheat, rye, oats, and some vegetables are cultivated. There are however extensive pastures on the higher parts. The climate is still more severe than it is between the ridges farther south, as the low ridges cannot shelter the plains against the prevailing north-west winds. The forests of the higher land are almost entirely composed of conifers, but they do not contain many timber-trees, the stony soil being too poor for their growth. In the depressions and along the rivers are sugar-maple, black walnut, elm, and beech.

III. *The North-Western Region* is divided from the mountain-region by Chestnut Ridge, whose northern prolongation divides the waters which run east to the Susquehanna and west to the Allegheny river. It constitutes the most eastern portion of the inclined plain which extends from the base of the Appalachian mountains westward to the banks of the Mississippi. Near the foot of the mountain it is from 900 to 1000 feet above the sea, and where it approaches the boundary-line of Ohio it is still nearly 700 feet above it, in the valley of the Ohio, but much higher farther northward, where it preserves the elevation of from 900 to 1000 feet to the very boundary-line. The surface of this region is undulating, the ascents being gentle and the upper part of the eminences broad, with a rounded outline, except along the watercourses of the larger rivers, where the ascent is rather steep. The soil varies very much. In many places there are large tracts with a poor and stony soil; in others, especially along the rivers, there are fertile tracts. The climate does not materially differ from that of the south-eastern region, except that the winters are colder, as may be inferred from the greater elevation of the country, and its exposure to the northern and north-western winds; the quantity of rain which falls is not quite so great. In the southern districts (south of 41° N. lat.) cultivation has made considerable progress, and the country presents a pleasing variety of fields and forests. All the grains of the south-east region are raised in abundance, and the orchards produce great quantities of fruit, especially apples and cherries. The forests consist chiefly of oak and sugar-maple. The northern districts are almost entirely covered with forests, consisting of hemlock, spruce, and Weymouth pine, intermixed with beech, birch, and sugar-maple. The Weymouth pine attains a great size in these districts.

Rivers.—The most important river of Pennsylvania is the Delaware, which is navigable for river boats to a distance of 200 miles from its mouth. [Delaware.] The Susquehanna rises in two branches on the table-lands of Pennsylvania and New York, of which the eastern branch originates near 74° 40′ W. long., and the western near 78° 40′, and consequently more than 200 miles from each other. The eastern branch, which is considered the principal, has its source in Lake Otsego, near the western declivity of the Tuscarora mountains in New York. [New York.] It traverses the table-land of New York in a south-western and western direction, and after a course of about 140 miles it enters Pennsylvania, and soon afterwards is joined by the Tioga river, which collects its waters on the table-land farther west, and flows about 30 miles. From the junction with the Tioga it flows about 50 miles south-east and afterwards about 70 miles south-west to its junction with the great western branch. Thus it runs about 260 miles above this confluence, which takes place a few miles north of Sunbury. The great western branch of the Susquehanna is, in all its extent, exclusively a river of Pennsylvania. It originates in a mountainous tract in which the Laurel Hills are connected with the Chestnut Range, south of 41° N. lat. Issuing from this tract by a northern and north-eastern course of about 50 miles, it flows over the table-land, with great bends mostly in an eastern direction, about 80 miles; it then turns southward and joins the eastern branch above Sunbury, after having run about 25 miles in that direction. This river runs 155 miles above its junction with the eastern branch. After the union of both branches, the Susquehanna runs southward for about 50 miles, traversing by narrow valleys five or six of the ridges, which here lie between the table-land and the south-eastern region. Before it reaches the lower country it is joined by the largest of its affluents, the Juniata, from the west. The Juniata rises on the western declivity of the Alleghany mountains, and runs first southward for about 20 miles; it then turns eastward, and after flowing in that direction about 10 miles more, it runs northward about 40 miles. By this circuitous course it collects by far the greatest part of the waters east of the Alleghany mountains in the mountain-region south of 41° N. lat. It afterwards runs eastwards with many large bends until it joins the Susquehanna about 35 miles below Sunbury, after an entire course of more than 150 miles. After having left the mountain region above Harrisburg, the Susquehanna still flows through a narrow valley formed by the South Mountain, 8 miles below Harrisburg, and before it enters this valley it is joined from the north-east by the Swatara creek, whose course hardly exceeds 50 miles. The course of the Susquehanna through the south-eastern region may be about 150 miles; so that the river flows 200 miles after the junction of its branches near Sunbury. The Susquehanna is not navigable, owing to the rapidity of its current and the numerous rocky ledges which form numerous rapids. The last of these ledges occurs about 20 miles from its mouth in Chesapeake Bay, and so far small vessels may ascend the river. The water of this river however has lately been used in the construction of canals. Some of the affluents of the Susquehanna, as the Tioga, Juniata, and Swatara, are navigable for small boats, at least a considerable part of the year, when the rivers are full.

The western part of the state is drained by the two principal branches of the Ohio, the Alleghany and Monongahela rivers. The Alleghany rises within this state on the table-land near 78° W. long. and 41° 50′ N. lat.: and after a circuitous course of about 30 miles it enters New York, where it becomes navigable for small boats at the town of Olean. About 20 miles lower down it re-enters Pennsylvania, and runs about 150 miles more, principally by a southern course and with numerous windings between high hills, to its junction with the Monongahela at Pittsburg. Though rather a rapid river, running at the rate of about two miles an hour, it is navigable for boats during several months of the year. The other branch of the Ohio, the Monongahela, rises in Virginia, near 38° 30′, about 250 miles from the source of the Alleghany. Its upper course is between the ridges of the Appalachian mountains, and impeded by rapids. The last of these occurs some miles south of the southern boundary of Pennsylvania, where the river breaks through the Chestnut Ridge. From this place it is navigable for boats to its junction with the Alleghany at Pittsburg. Its course is in general nearly north, and it runs perhaps not less than 200 miles. The Ohio, which is formed by the junction of these two branches, runs westward about 40 miles through Pennsylvania, and is joined from the north by the Big Beaver river, which is navigable for boats as far as the boundary-line between Pennsylvania and Ohio. As to the Ohio, see Mississippi, vol. xv, p. 284.

Productions.—The principal agricultural products and forest-trees have been already noticed. The waggon horses of Pennsylvania are of extraordinary size and strength. Their average height is about 5 feet 4 inches, but the larger sometimes attain a greater height. Cattle are numerous, especially in the north-west region, and generally of a good breed. Sheep are kept in most parts, but the wool is not fine. The wild animals have much diminished. The elk has entirely disappeared, and the deer begins to be scarce. In the northern and less cultivated districts are still found the brown bear, the wolf, wild cat, fox, racoon, and opossum; also squirrels, rabbits, hares, and minxes. Among the birds, the wild turkey is the largest. Several kinds of fish are plentiful in the rivers, as salmon, trout, carp, shad, &c.

Pennsylvania is rich in minerals. The most important is coal, both anthracite and bituminous. The anthracite coal is found near the eastern extremity of the ridges of the Appalachian mountains, from 50 to 80 miles from the banks of the Delaware river, where it exists in three large fields or deposits. The most southern lies on the northern side of the Blue Mountains, where, according to a rough estimate, it occupies an extent of country 65 miles in length and 5 miles wide, or an area of 325 square miles. It is worked in several places, near Port Carbon on the Schuylkill, and near Mauch Chunk on the Lehigh. The quantity of coal extracted from this field in 1833 amounted to 429,[illegible] tons. The second field lies farther north on both sides of the Lackawannock, a branch of the eastern Susquehanna, and is said to occupy a similar extent of country. It is worked at some places, and in 1833 not less than 161,[illegible] tons of coal were taken from it. The third coal-field lies farther inland on both sides of the Susquehanna, above its confluence with the Juniata. It is not yet worked. It is supposed that these three coal-fields occupy an area of [illegible] square miles. The bituminous coal-fields of Pennsylvania lie on the western declivity of the Alleghany mountains, where the coal is found in beds varying in thickness from an inch to six feet and upwards. These beds extend over an immense tract southward into Maryland and Virginia, but it is not known if they pass the boundary of New York. It is stated that they occupy an area of 2[illegible],000 square miles, which is probably an exaggeration. The abundance of coal gives to Pennsylvania a great advantage as a manufacturing country. The western coal-fields are little worked, as the surrounding country abounds in forests; but in the manufactures of Pittsburg, and in those of salt, about 250,000 tons are annually consumed.

Salt-springs are common all over the region of the bituminous coal. Wherever the earth in this region has been penetrated to any considerable depth, salt water has been found, and salt-works on a large scale exist on the Conemaugh, an affluent of the Alleghany river, and at several other places. The quantity of salt obtained in them was, in 1834, estimated at one million of bushels. Iron-ore is abundant all over the state, except the south-eastern region, and is worked in several places, but not to a great extent. Copper and lead occur in some places. Marble of beautiful variety and excellent texture is found in the hills of the south-eastern region, and is much used in building. Slate and limestone abound in some places.

Canals and Railroads.—The first canals were made for the purpose of bringing the produce of the coal-mines to the market. The oldest is the Schuylkill Canal, which was commenced in 1816. It begins at the Fair Mount water-works, near Philadelphia, and extends along the Schuylkill river to Reading, and thence to Mount Carbon, where the mines are worked. Its length is 108 miles, of which 16 lie in the bed of the river, and the rest in canals. In 1833 not less than 261,654 tons of goods descended this canal, of which 252,971 were coal, and 33,219 lime and limestone. In the same year 54,735 tons of goods ascended it. The Lehigh Canal, which was only finished in 1836, extends from Easton on the Delaware, up the Lehigh river, to the coal-mines of Mauch Chunk, a distance of 46 miles. It is of larger dimensions than the other canals, admitting boats of 150 tons. In 1833, 123,000 tons of coals were brought down, but at present probably more than twice that quantity. The Lackawaxen Canal begins at the confluence of that river with the Delaware, and extends to Honesdale 26 miles; from Honesdale a railroad runs to Carbondale, a distance of 16 miles, to the coal-mines in the county of Luzerne. More than 100,000 tons of coal were brought down this canal in 1833.

The canals, designed in general for the transport of goods, began to be made only about fifteen years ago. The chief is the Delaware and Erie Canal, which connects the Delaware river with Lake Erie. This great line of communication begins at Philadelphia with a railroad, which traverses the south-eastern region, and terminates at Columbia on the Susquehanna. At this place a canal begins, which extends along the river upwards to the mouth of the Juniata. It thence follows the course of the last-mentioned river to Huntingdon, where it leaves the main body of the Juniata, and runs along one of its affluents, called the northern branch of the Juniata, to the foot of the Alleghany mountains, where it terminates at Hollidaysburg. The Alleghany mountains, which rise more than 1400 feet above their base at Hollidaysburg, are traversed by a railroad 36 miles long, which terminates on their western side at Johnstown. Here the second line of canals begins, which first runs along the banks of the river Conemaugh to its confluence with the Alleghany, and then along the last-mentioned river to Pittsburg, where it ends: the Ohio, between Pittsburg and the mouth of the Big Beaver river, a distance of 26 miles, constituting the link which connects the second line of canal-navigation with the third line. The Big Beaver affords an easy navigation for canal boats as far up as Newcastle, 24 miles, where the third line begins. This line runs along the Big Beaver to its very source, traverses the high country dividing that river from the Cuyahoga river near Ravenna, and joins the Erie and Ohio canal near Akron. The last-mentioned canal terminates at Cleaveland on Lake Erie. [OHIO.] The whole distance from Philadelphia to Cleaveland by this route is about 530 miles, of which 118 are by railroads, 52 miles by the Ohio and Big Beaver rivers, and the remainder by canals.

Several lateral lines are connected with this great line of internal communication. From the mouth of the Juniata river a canal runs up the Susquehanna to Northumberland, where the two great branches of that river unite. At this place another canal begins, running up the eastern Susquehanna to a point two miles below Wilkesbarre. These two canals taken together are 95 miles long. From Northumberland another canal proceeds along the western Susquehanna to the centre of Lycoming county; it is 70 miles long. A canal has been made to connect the Schuylkill canal with the great line, which is called the Union Canal. It begins near Reading on the Schuylkill, and runs along the bed of two small rivers, the Tulpehoken, an affluent of the Schuylkill, and the Swatara, a tributary of the Susquehanna, terminating on the last-mentioned river at Middletown; it is 82 miles long.

As the Delaware river above Trenton presents obstructions to navigation for several months of the year, a canal has been made along its course. It begins at Bristol on the Delaware, and terminates at the mouth of the Lehigh. This canal is 60 miles long. One of the upper branches of the Alleghany river, called the French Creek, has much water, but is not navigable for boats, on account of several rapids. A canal has accordingly been made along its course, which extends from its confluence with the Alleghany in Franklin, a distance of about 22 miles.

All the canals of this state are now 900 miles in length, of which about 600 miles are at the expense of the state; and the railroads which are connected with them are 118 miles. The expenses incurred by the state in the construction of canals exceed considerably the sum of 22 millions of dollars. The canals leading to the coal-mines, and the Union Canal, have been made at the expense of incorporated companies of private persons, and have cost more than six millions of dollars.

Inhabitants.—According to the census of 1820, the population of Pennsylvania consisted of 1,049,458 individuals, which, in 1830, had increased to 1,348,233, which was an increase of more than 28 per cent. In the last-mentioned year there were nearly 30 persons to a square mile. There were then 38,333 persons of colour among the inhabitants. The population is very unequally distributed. The south-eastern region, though it forms less than one-sixth of the area, contains nearly one half of the population, and the north-western region, which is little more than half as large as the mountain region, equals the latter in population. In the mountain region the population to a square mile hardly exceeds 12 individuals, while there are nearly a hundred to a square mile of the south-eastern region.

In no part of the United States is the number of German settlers and their descendants so large as in Pennsylvania. There are districts in which the German is the prevailing language. It is supposed that the Germans form one-fourth of the population. They have their own schools and institutions of education, in which the instruction is given in the German language. A great number of German newspapers are printed. The Germans are either Calvinists or Lutherans. The native tribes, which, in the middle of the last century were still in the undisturbed possession of the mountain and north-western regions, have entirely disappeared.

Manufactures.—Pennsylvania is one of the most manufacturing of the United States. Though the manufactures of cotton, woollen, and linen stuffs are less extensive than those of New York and Massachusetts, those of iron, paper, and glass are the most extensive in the Union. The iron manufactures occupy the first place. They are chiefly in the north-west region, at Pittsburg, Brownsville on the Monongahela, and some other places. One of the principal objects is the manufacture of steam-engines for the navigation of the Ohio and Mississippi, and for the railways. In 1830 not less than one hundred steam-engines were made at Pittsburg. Next to this are sugar-mills and machinery for a great variety of purposes; and then follows a long list of utensils, as stoves, chain-cables, mill and crosscut saws, spades and shovels, wood-screws, sickles, hammers, gimlets, braziers' rods, door locks, latches, knives, razors, and various kinds of carpenters' tools. The finer kinds of edge-tools, as well as rifles and muskets, are not made to so great an extent, though of late there has also been an increase in this branch of the iron manufacture. Glass appears to be the second manufacture as to amount. There are glass-houses at Pittsburg, Brownsville, and near Philadelphia, and great quantities of flint glass, domestic glass, window-glass, and bottles are made and sent to other states. The manufactures of paper are perhaps almost equal in value to those of glass. More than fifty years ago there were numerous paper-mills, and the number has now greatly increased. They are dispersed over the more inhabited districts. Leather-making is also a considerable branch of industry. The largest tan-yards are at Pittsburg, but they are numerous in the smaller towns in the north-west region. In several places hats are made, as at Philadelphia, Pittsburg, and at Reading on the Schuylkill, and at Bedford on the Juniata. There are also manufactures of sail-cloth, ropes, stockings, potash, tobacco, earthenware, china, candles, coaches, &c.

Commerce.—The produce of the agriculture and manufacturing industry of Pennsylvania is carried to the other states of the Union or to foreign countries by three different routes. The south-eastern region sends its products by the way of Philadelphia, which is the only seaport in the state. [PHILADELPHIA.] Though at present a complete line of communication by means of canals and railroads exists between the south-east and north-west regions, the greater quantity of the produce of the last-mentioned country is too heavy to be transported about 500 miles in such a manner. It was accordingly formerly sent to the western states by boats and smaller vessels which navigated the Ohio and Mississippi to Cincinnati, St. Louis, and New Orleans, from which places it reached the place of consumption. But since the canal uniting Pittsburg and Cleaveland (the port of Ohio on Lake Erie) has been finished, a considerable portion of the goods produced and made in the north-western region finds its way into the state of New York, and those of New England through Cleaveland and the Erie

Canal. This new route cannot fail to increase in a very considerable degree the manufacturing industry of that part of Pennsylvania.

Political Divisions and Towns.—Pennsylvania is divided into fifty-one counties. The seat of government is at Harrisburg, on the Susquehanna, not far from the place where the river issues from the mountains. It is well laid out. In 1830 it contained 4307 inhabitants, but it can only rise to importance when the northern district is well inhabited and cultivated. The largest town of the state is Philadelphia. [PHILADELPHIA.] South-west of it, on the banks of the Delaware, is Chester, with 1500 inhabitants, and a good anchorage. Easton, likewise on the Delaware, at the mouth of the Lehigh river and the commencement of the Lehigh canal, is a thriving place, with more than 3000 inhabitants. Reading, on the banks of the Schuylkill, near the place where the Union canal joins the Schuylkill canal, is a very thriving place, which in 1830 had 5831 inhabitants, and hat manufactures. Lebanon, on the Union canal, has above 2000 inhabitants. Lancaster, the largest place in the south-east region next to Philadelphia, had, in 1830, 7684 inhabitants, mostly employed in the manufactures of cotton and wool, iron, leather, hats, ropes, and tobacco. North of it is Ephrata, or Dunkertown, the principal settlement of the German Anabaptists, who have established several manufactures of linen, wool, paper, parchment, and leather. Carlisle, not far from the foot of the Blue Mountains, in the fertile valley of Cumberland, has 3000 inhabitants, and a college called Dickinson College. York has 3000 inhabitants, and some manufactures on a small scale, with an academy for Germans. Gettysburg, a small place, has a college for Lutheran clergymen: in its vicinity some silver-ore was found in 1826.

None of the towns in the mountain region have risen into importance. Sunbury and Northumberland, as well as Wilksbarre, are advantageously situated on the Susquehanna canal; and Lewistown and Huntingdon on the Delaware and Erie canal. Bedford, on the Juniata, which begins to be navigable at this place, has some commerce, and manufactures hats.

The most important place in the north-west region is Pittsburg, which stands on the peninsula formed by the confluence of the Alleghany and Monongahela rivers, where the navigation of the Ohio in larger boats begins, and on the site of the old French post Fort Duquesne. It is the principal point through which the traffic between the countries west of the Appalachian Mountains and those along the Atlantic is carried on by land. Besides the line of communication established by canals and railroads, an excellent turnpike-road leads through Maryland to Baltimore and Washington. The navigation on the Ohio, Big Beaver river, and the canal to Cleaveland in Ohio, increases the great advantages possessed by this place, among which the most important are the immense beds of coal which surround the town. The population has rapidly increased. In 1820 it was 7248; in 1830, 12,568, exclusive of the suburbs, and with them, 22,433; and probably it is at present nearly 50,000. In the beginning of 1835 there were sixteen foundries and engine-factories on a large scale, besides some of less magnitude; nine rolling-mills, cutting two tons of nails and rolling eight tons of iron per day; six cotton factories, having 20,000 spindles and 116 power-looms; six extensive white-lead factories; six steam saw-mills; four steam grist-mills; five large breweries; ten extensive glass-works; and upwards of 100 steam-engines in full operation; besides numerous other manufactures in iron, wood, and leather, on a small scale. Brownsville, on the Monongahela, which becomes navigable some miles higher up, is a small but thriving place, with some iron-manufactures. Erie, a small place with 1500 inhabitants, on the shores of Lake Erie, is a port of entry, but has little commerce, the surrounding country being very thinly inhabited.

Education and Religion.—The state has nine colleges, five of which are in the eastern part of the state, and four in the western. The University of Pennsylvania, in Philadelphia, has an academic faculty of five professors, and a medical faculty of nine professors; it is the largest and best medical school in America. Dickinson College, at Carlisle, has four instructors, and a library of 7000 volumes. La Fayette College, at Easton, has a president and three professors. Pennsylvania College, at Gettysburg, has a president and four professors. Bristol College has a president and five instructors. The Western University, in the northern suburbs of Pittsburg, has four instructors. Jefferson College, at Canonsburg, has a president and six professors, w[illegible] library of 3500 volumes. The Jefferson Medical Sc[illegible] which is in Philadelphia, is a branch of this institution, [illegible] has six professors. Washington College, at Wash[illegible] has seven instructors, and a library of 1500 volumes. A[illegible] hany College, at Meadville, has four instructors, and a l[illegible] of 8000 volumes. None of these institutions, the [illegible] departments excepted, have attained a high reputa[illegible] and indeed education generally is far less an object [illegible] pular favour in Pennsylvania than in the States north [illegible] In 1831 however provision was made by the legislat[illegible] a 'common school fund,' which was to accumulate un[illegible] amounted to 100,000 dollars a year. Bethlehem, a M[illegible] vian settlement on the Lehigh, is the seat of a very su[illegible] ful seminary for females. As to the munificent dona[illegible] Stephen Girard to the city of Philadelphia, see that ar[illegible]

The principal sects in the state are Presbyterians, M[illegible] dists, Baptists, German Reformed, and Episcopal an[illegible] Quakers are also numerous in the eastern part of the [illegible] and the Roman-Catholics in every part. A large [illegible] the population of Pennsylvania, especially in the middl[illegible] western districts, are Germans; they retain the use [illegible] language, and a considerable number of newspapers [illegible] German are printed and circulated in the state.

History and Constitution.—The first settlements on [illegible] shores of Chesapeake Bay were made by the Swedes in [illegible] Though engaged in a long war with the Poles, Gu[illegible] Adolphus sent a small colony to this part of America, [illegible] settled on Chesapeake Bay. But his attention was [illegible] diverted from it by the wars in Germany. When Char[illegible] was at war with Denmark, and the Dutch had de[illegible] against him, they took possession of the Swedish [illegible] in 1658, and kept it, but were obliged to cede it to the E[illegible] lish in 1664. Several dispersed settlements had [illegible] formed along both sides of Chesapeake Bay. The c[illegible] was granted by Charles II. in 1681 to William Penn, wh[illegible] sidered it just to buy from the original possessors, the In[illegible] what had been granted by the king of England. In 1[illegible] founded the town of Philadelphia, and framed a consti[illegible] which was confirmed by an assembly of the people at C[illegible] in December, 1682. The humane principles on which [illegible] constitution and laws of Penn were based, attracted n[illegible] rous colonists to this country from most parts of E[illegible] especially from Germany. They all settled however [illegible] south-east region, whilst the Indians remained in u[illegible] turbed possession of the north-west region. The Fr[illegible] advancing from Canada, got possession of this back c[illegible] and built Fort Duquesne in 1752. This fortress was [illegible] Pittsburg after it was taken by the British. In th[illegible] the colonists who inhabited the country near the m[illegible] suffered much from the incursions of the Indians, w[illegible] taken part with the French. In 1774 the delegates [illegible] colonies assembled in Philadelphia, declared against [illegible] right of the English parliament to tax the co[illegible] which may be considered as the declaration of [illegible] and in 1776 the representatives of the thirteen sta[illegible] clared their independence. The seat of the federal g[illegible] ment was at Philadelphia till 1800, when it was rem[illegible] Washington. The constitution of Penn was amende[illegible] ral times, and remodelled in 1777, after the declarati[illegible] independence. The last alteration was in 1838. Acc[illegible] to this constitution, the legislature consists of tw[illegible] a House of Representatives and a Senate. The nu[illegible] representatives is 100. They are elected for one y[illegible] all persons who are twenty-one years of age, who [illegible] sided two years within the state, and have paid taxe[illegible] number of senators is thirty-three. They are chose[illegible] four years, in districts, by the same persons who are e[illegible] to elect the representatives: one-fourth are annually re[illegible] The executive power is vested in the governor, wh[illegible] by the citizens for three years, and may, if re-elect[illegible] his office nine years out of twelve. Pennsylvan[illegible] two members to the Senate, and twenty-six members [illegible] House of Representatives at Washington.

(Darby's *View of the United States*; Pitkin's *St*[illegible] *View of the Commerce of the United States*; James[illegible] *count of Long's Expedition to the Rocky Mountains*; [illegible] ing's *Narrative of Long's Expedition to the Sour*[illegible] *Peter's River*; Wood's *Two Years' Residence in* [illegible] *Country*, London, 1822; &c.)

PENNY. [COIN.]

PENNYROYAL. [MENTHA PULEGIUM.]

PENOBSCOT. [Maine.]

PENRITH. [Cumberland.]

PENRYN, a corporate town in the parish of Gluvias, in the east division of the hundred of Kerrier, in the county of Cornwall, 271 miles from the Post-office, London, by the Falmouth and Exeter mail road, which is by the south-western railway to Basingstoke, and thence, by road, through Andover, Salisbury, Exeter, Launceston, and Bodmin.

Penryn was made a market-town A.D. 1236, and was incorporated by James I. It was garrisoned by Charles I. in the great civil war, and surrendered to Fairfax, March, 1646. The town is about two miles from Falmouth, at the end of one of the inlets of Falmouth Harbour. It is built on a low hill projecting eastward into the inlet and dividing it into two navigable branches. At the point between these branches is the public quay, from which place the main street of the town gradually rises along the ridge of the hill to its western extremity, more than half a mile in length, having other streets and lanes branching off into the valleys on each side. The two navigable branches of the inlet from Falmouth Harbour allow a commodious quay for vessels, and there is a considerable trade carried on between Penryn and the populous mining district of Redruth. There is an episcopal chapel, and several dissenting places of worship. The area of the municipal borough comprises 230 statute acres. In 1831 it contained 398 inhabited houses, and in 1835, 722 (*Municipal Corporation Boundaries Report*); the population, in 1831, was 3521, a small part agricultural. The buildings of the town extend beyond the borough limits into the parishes of Gluvias and Budock. The trade consists in the exportation of granite (which is considerable and increasing), and in the importation of corn and flour for the supply of the surrounding district. There are colour-works, corn-mills, breweries and numerous shops. There is a weekly market, and there are five cattle-fairs in the year.

The borough returned two members to parliament from the time of James I. By the Reform and Boundary Acts Falmouth was, for parliamentary purposes, united with it. The number of voters in the year 1835-6 was, for the united borough, 882. The council, by the Municipal Reform Act, consists of 4 aldermen and 12 councillors, but the borough was not to have a commission of the peace except on petition and grant. An enlargement of its municipal boundary is proposed in the Commissioners' 'Report.' Penryn is a chapelry or perpetual curacy in the vicarage of Gluvias.

There were, in 1833, in the borough, one infant-school, with 50 girls and 80 boys; one national school, with 130 boys; nine other day-schools, with 217 children of both sexes; two boarding-schools, with 77 children; and three Sunday-schools, with 365 children of both sexes. In that part of Gluvias parish which is not included in the limits of the borough there were three day-schools; one, a national school, with 137 boys, and two others with 42 children; and one Sunday-school, with 150 children.

PENSA is an extensive government of Russia in Asia, which, after having formed a province of the Khanate, or great government of Kasan, was erected into a separate government in 1780. In 1796 it was united with the government of Saratoff, from which it was again separated in 1801 by the Emperor Alexander. It is bounded on the north by Nischnei Novogorod, on the east by Simbirsk, on the south by Saratoff, and on the south-west and west by Tamboff. It lies between 52° and 54° N. lat., and between 42° 30′ and 46° 30′ E. long. The surface is slightly undulating, and the general character of the country is a plain. It is watered by numerous rivers, but most of them are small and not navigable. The most important rivers are the Soura and the Moksha. The Soura, which rises in Saratoff, passes Pensa to the south of the chief town, traverses the eastern part of the government, and enters Simbirsk. The Moksha rises in the government itself, waters the north-west part of it, and after running northwards turns to the west, and enters the government of Tamboff. The government contains six small lakes. The climate is temperate and very agreeable in summer, but the winter is rather cold; the sky is clear and the air very healthy.

The soil is extremely fertile and produces, without manure, fine crops of wheat, rye, barley, and oats, which not only supply what is required for the home consumption, but a considerable overplus for exportation. Hemp and flax flourish, and the gardens produce all kinds of vegetables. Tobacco and hops are not grown, and potatoes only here and there. The inhabitants grow apples, pears, and cherries, but pay little attention to them. Wild berries of various kinds are extremely plentiful. The forests are of vast extent, but, as we have observed in other provinces of Russia, the most extravagant waste has been committed in them. Firs are rare in the forests, which consist chiefly of the oak, the beech, the birch, and the alder. There are still wild deer and a great quantity of game, but the fur-bearing animals have disappeared. The chief occupations of the inhabitants are grazing and agriculture, and the Mordwins in particular have great quantities of bees. The fisheries are of little importance. The mineral kingdom furnishes a little iron, vitriol, sulphur, and saltpetre. The population and extent of this government have been variously stated. Dr. Schnitzler (1835) gives it an extent of 16,100 square miles, and only 470,000 inhabitants, in which he has probably, by an oversight, taken the number of males, who alone are counted in most of the governments. But M. Keppen, member of the academy of sciences, who is employed under the minister of the domains of the empire, has just published a very remarkable memoir on the population of the Russian empire in 1838, which is not only the latest but probably the most correct that has yet appeared. He states the population of Pensa at 486,021 males and 502,779 females (total 988,800); and the territorial extent at 15,167 square miles, divided into ten circles. The great majority of the inhabitants are Russians of the Greek church, with whom some Cossacks are blended, but there are also Mordwins (about 15,000 males), mostly converted to Christianity; and Kasan Tartars (9000 males), who are still Mohammedans. The very few followers of Schamanism are among the Mordwins.

There are few manufactures, properly so called, on a large scale. A few years ago there were twelve of cloth, seven of soap, three of glass, six of beet-root sugar, besides thirty-four tan-yards, &c. But the country-people manufacture coarse linen and woollen cloth, and all kinds of articles for their own use. There is a manufactory of blankets and carpets at the village of Jelá. The distilling of brandy is carried on to a very great extent. The trade is chiefly carried on by land, especially with Nischnei Novogorod. Annual fairs are held at Pensa, Nischnei Lomoff, and Saransk. The exports are corn, flour, brandy, soap, wax, honey, potashes, wool, sail-cloth, carpets, blankets, wooden ware, &c.

With respect to public instruction, Pensa is under the university of Kasan, but the schools are few in number. The only printing office belongs to the crown. There are in the government 619 churches, of which 11 are cathedrals, five monks' convents, and one nunnery. The Tartar mosques are to the number of 70, of which 33 are of the first class.

Pensa, the capital of the government, is built on an eminence at the conflux of the Pensa and the Soura, in 53° 7′ N. lat. and 44° 55′ E. long., 465 miles from Moscow. It was founded in 1666, and is a flourishing town, with manufactories of leather and soap, in which, and in corn, there is a brisk trade. Pensa is a bishop's see, and has a gymnasium, a seminary, two convents, to each of which two churches are attached; seven other churches, and a cathedral. The houses are all of wood, and the population 11,000. The capitals of the other nine districts, though not very interesting, are pretty considerable; the principal are Nischnei-Lomoff (7000 inhabitants), where a great annual fair is held from the 1st to the 15th of July; the chief articles sold are leather, furs, wax, drugs, and colonial produce; and Saransk, at the conflux of the Saranga and the Issara. It has nearly 9000 inhabitants, nine churches, two cathedrals, and a convent of monks. It is a very thriving little town.

(Schnitzler, *La Russie et la Pologne*; Hörschelmann, *Handbuch*; Erman, *Reise nach Sibirien*; *Russian Official Journals*.)

PENSACOLA. [Florida.]

PENSION, an annual sum granted by the state to an individual. The grounds upon which pensions are granted by the state differ according to the nature of the government. In a monarchy the services rendered to the sovereign by those who surround his person will recommend them as fitting objects of reward; where a mixed form of government prevails, attempts will be made to establish some standard of reward independent of personal bias or caprice. In this country the distribution of pensions is now almost entirely subject to the control of the legislature; but the following notice will show that persevering and long-continued efforts have been necessary to place it upon this footing.

Before the reign of Queen Anne, the kings of England alienated or encumbered their hereditary possessions at pleasure, and the courts of law sustained them in the exercise of this power. In 1690-91, Chief-Justice Treby, in answer to the objection that such power might lead to the destruction of the revenue, said, 'This might be some reason to induce the making of an act of parliament to restrain the king's power of alienation; but since here the parliament has thought fit to give the king such a power, we ought to acquiesce and submit to it.' (*State Trials*, vol. xiv., p. 30.) By the 1 Anne, c. 7, the right of burthening the revenue of the crown with improvident grants, to the injury of the successors of the throne, was materially abridged. This statute, after reciting that 'the necessary expenses of supporting the crown, or the greatest part of them, were formerly defrayed by a land revenue, which hath from time to time been impaired and diminished by the grants of former kings and queens of this realm,' enacts that no grant of manors, lands, &c. shall be made by the crown from and after the 25th of March, 1702, beyond the term of thirty-one years or for three lives, reserving a reasonable rent. As this clause applied only to the land revenue, it was enacted by another clause that no portion of other branches of revenue, as the excise, post-office, &c., should be alienable by the crown beyond the life of the reigning king. On the accession of George III., in consideration of the surrender of the larger branches of the hereditary revenue, a civil list was settled on his majesty, amounting originally to 800,000*l.*, and afterwards increased to 900,000*l.*, on which the pensions were charged. There were no limits, except the Civil List itself, within which the grant of pensions was confined; and at various times, when debts on this list had accumulated, parliament voted considerable sums (Sir Henry Parnell, in his work on 'Financial Reform,' says 'some millions') for their discharge. In February, 1780, during the administration of Lord North, Mr. Burke introduced his bill for the better security of the independence of parliament and the economical reformation of the civil and other establishments. In this bill it was recited that the pension lists were excessive, and that a custom prevailed of granting pensions on a private list during his majesty's pleasure, under colour that in some cases it may not be expedient to divulge the names of persons on the said lists, by means of which much secret and dangerous corruption may be hereafter practised. Mr. Burke proposed to reduce the English pension list to a maximum of 60,000*l.*, but the bill, as passed, fixed it at 95,000*l.* This act (22 Geo. III., c.) asserted the principle that distress or desert ought to be considered as regulating the future grants of such pensions, and that parliament had a full right to be informed in respect to this exercise of the prerogative, in order to ensure and enforce the responsibility of the ministers of the crown. Mr. Burke's speech on introducing his bill will be found in the third volume of his 'Works,' ed. 1815.

Up to this time the Civil List pensions of Ireland, the pensions charged on the hereditary revenues of Scotland, and the pensions charged on the 4½ per cent. duties, had not been regulated by parliament.

In Ireland the hereditary revenue of the crown was used as a means of extensive political corruption, the English act of 1 Anne, already cited, not being applicable to Ireland. In a speech of Mr. Hutchinson, secretary of state, made in the Irish House of Commons, in June, 1793, he stated that the gross annual hereditary revenue of Ireland amounted to 764,627*l.*, reduced by various charges to 275,102*l.* only; that the disposition of this revenue was in the hands of the king; that 'his letters and seals were the only authority for using it, and the only voucher allowed by the Commissioners of Accounts and by the House of Commons;' and that there was no Board of Treasury executing their functions under the authority of parliament. The Irish parliament, in 1757, had come to a unanimous resolution, 'That the granting of so much of the public revenue in pensions is an improvident disposition of the revenue, an injury to the crown, and detrimental to the people.' The Irish pensions then amounted to 40,000*l* : in two years after the above resolution was passed, an addition of 26,000*l.* was made to them; and in 1778 they were nearly double the amount at which they stood in 1757. In 1787 leave was refused to bring in a bill to limit the amount of pensions, and to disable persons holding pensions for a term of years, or during pleasure, from sitting and voting in parliament.' Mr. Forbes, who moved this bill, stated that 'it was a practice among certain members of the House to whom pensions had been granted, to carry them into the market and expose them for sale.' In 1790 Mr. Forbes again moved resolutions, stating 'that the Pension List amounted to 101,000*l.*, exclusive of military pensions; that the increase of pensions, civil and military, since February, 1784, had been 29,000*l.*; and that many of these pensions had been granted to members of parliament during the pleasure of the crown.' These resolutions were not adopted. In 17[illegible], when the whole policy of the Irish government was changed, among other beneficial measures introduced and recommended on the authority of the lord-lieutenant was a bill to limit the amount of pensions and to increase the responsibility of the Treasury, which was passed into a law. By this act (33 Geo. III., c. 34, Irish statutes) the pensions on the Civil List in Ireland were limited to 80,000*l.*, allowing a sum of 1200*l.* only to be granted until such reduction was effected. Grants held during the pleasure of the crown, and converted into grants for life to the same parties and the same amount, were exempted from the limitations of the act. This act carried into effect a surrender of the hereditary revenues for the life of the king, and the principle of appropriating money by parliamentary authority. These restraints on the crown were not however equal in efficiency to those contained in the English statute of Anne. At the time of the act of 33 Geo. III. being passed, the Irish pensions amounted to 124,000*l.*, and the amount was to be reduced to 80,000*l.* until 1814. By the 1 Geo. IV., c. 1, the Irish Pension List was further reduced to 50,000*l.*, no grant exceeding 1200*l.* to be made in any one year until the list was so reduced.

The statute of 1 Anne, having been passed prior to the Union, did not affect Scotland; and pensions were accordingly granted by the crown for life or for lives, in possession or in reversion, without restriction in amount or in the duration of the grant, other than the amount of the revenue and the claims and burdens already upon them. By the 50 Geo. III., c. 3, the principle of parliamentary interference was established in reference to the hereditary revenues of Scotland, the amount of the pensions was reduced to 25,000*l.*, and no more than 800*l.* was to be granted in any year until such reduction was effected. At this period the Civil List pensions of Scotland amounted to 39,379*l.* By the 1 Geo. IV., c. 1, the hereditary revenues of Scotland were placed to the account of the consolidated fund.

Certain duties, called the four and a half per cent. duties, were not withdrawn from the private control of the crown until 1830, when they were surrendered by William IV. for his life, the pensions then chargeable upon them continuing payable. On the accession of the late king (Wm. IV.) there was nothing therefore to prevent the Pension Lists of England, Ireland, and Scotland being consolidated; this was effected by 1 Wm. IV., c. 25, which also made provision for their reduction, on the expiration of existing interests, from an amount of 145,750*l.* net, to a future maximum sum of 75,000*l.* The Pension List for England was at that period 74,200*l.* net; Scotland, 23,650*l.*; Ireland, 47,9[illegible]

In 1830 the ministry of the Duke of Wellington was overthrown on the question of referring the Civil List (which comprises the Pension List) to a select committee, Sir Henry Parnell's motion to that effect being carried by 233 against [illegible]

In February, 1834, in order to define with greater precision the class of persons to whom the grant of pensions ought to be confined, Lord Althorp, chancellor of the Exchequer (now Earl Spencer), moved resolutions to the following effect, which were agreed to by the House of Commons:—'That it is the bounden duty of the responsible advisers of the crown to recommend to his Majesty for grant of pensions on the Civil List such persons only as have just claims on the royal beneficence, or who, by their personal services to the crown, by the performance of duties to the public, or by their useful discoveries in science and attainments in literature and the arts, have merited the gracious consideration of their sovereign and the gratitude of their country.'

On the accession of Queen Victoria, in 1837, the subject of pensions was again considered; and a select committee of the House of Commons, appointed to inquire into the Civil List, recommended,—'That in place of granting a sum of 75,000*l.* for Civil List pensions, her Majesty should be en-empowered to grant in every year new pensions on the Civil List to the amount of 1200*l.*, these pensions to be granted in strict conformity with the resolution of the House of Commons of February, 1834.' These views were adopted by the House, and embodied in the 1 Vic., c. 2, the words of the resolution being introduced into the Act. Since the accession of Queen Victoria, still greater force has been given to the spirit of the Act, in consequence of the recommendations of a select committee of the House of Commons, appointed in December, 1837, to inquire how far the pensions charged on the Civil List, as settled on the accession of William IV., ought to be continued, 'having due regard to the just claims of the parties and to economy in the public expenditure.' This committee, after a searching and protracted inquiry into the merits of each case on the Pension List, recommended the immediate suspension of several pensions, to be regranted on the responsibility of the government, should the circumstances of the parties render it necessary; others they considered should determine at an earlier period than specified in the original grant; and for several pensions, they considered it unadvisable to make any future provision. In their Report, dated July, 1838, the committee recommended that in the case of all future Civil List pensions, the reasons and motives of the grant should be set forth in the warrant of appointment; that in pensions granted for services to others than the individual by whom the services were rendered, care should be taken, if these pensions are granted for younger lives, that is, to the sons or daughters of the individual entitled to the pension, that no undue increase of charge should be made; and that such grants should be avoided, except under very peculiar circumstances: they recommended also that pensions for the relief of distress should be granted only on the condition of their ceasing when the circumstances of the parties no longer require their continuance; that all pensions should be held liable to deduction or suspension in the event of the parties being appointed to office in the public service; that under no circumstances should the mere combination of poverty with the hereditary rank of the peerage be considered as a justification of a grant of pension. The committee also recommended that, in order to avoid any possible doubt or misconception hereafter, enactments should be made with respect to the Irish and Scotch revenue analogous to those contained in the English statute of 1 Anne.

It appears from a table in the Report of the Select Committee on Pensions (No. 421, sess. 1838) that the charge of pensions has been reduced as follows:—

	England	Ireland	Scotland	4½ per Cent.	Total
	£	£	£	£	£
1784	86,000	80,000	12,300	16,700	195,000
1829	74,200	61,300	47,100	30,300	212,900
1837	74,200	36,900	33,200	21,100	165,400
1838	The lists consolidated.				146,900

Mr. Finlayson, of the National Debt Office, calculated, in 1838, the amount of saving which will be derived from the new system, assuming the ratio of decrease to continue as in the three previous years, and that the average ages of persons to whom new grants of pensions are made will be the same as heretofore:—

	Old Pensions.	New Pensions.	Total.
	£	£	£
1839	132,632	2,384	135,016
1844	97,340	5,677	103,017
1849	59,230	13,326	72,556
1854	30,702	18,245	48,947
1859	13,161	21,716	34,877

Mr. Finlayson was furnished by the committee with the ages of 986 persons in the receipt of pensions; and in 879 of these cases the date of the grant was ascertained. The mean age at which pensions were granted to males he found to be 53, and to females 39; and out of every 1000*l.* payable, 267*l.* was paid to males and 733*l.* to females. Mr. Finlayson complains that 'the females have understated their ages very considerably, and sometimes with a contempt of all probability, more than one lady having set down her age at 10, forgetting that she has been forty-five years in receipt of the pension, and thus from an infant to over the age of 40.'

The following is an account of the total amount of pensions granted in each year, ending the 20th day of June, from 1829 to 1839 inclusive:—

1829	-	£1853	1835	-	£1788
1830	-	5156	1836	-	1310
1831	-	2401	1837	-	2300
1832	-	7416	1838	-	640
1833	-	900	1839	-	330
1834	-	2479			

Besides the pensions on the Civil List, the regulation of which at different periods has been referred to above, there are vast sums annually appropriated by parliament to the payment of pensions of another description. Thus in 1836-7 the sum of 1,240,000*l.* was voted on account of the pensioners of Chelsea Hospital, 79,629 in number; 245,000*l.* to the out-pensioners of Greenwich; 145,000*l.* to 4083 widows of officers of land-forces; and to officers in each of the civil departments of the government large sums are annually paid in pensions and superannuation allowances. The half-pay to retired officers of the navy and army may also be considered in the light of a pension. In 1832 the charge on the public for pensions, superannuations, and half-pay amounted to 6,142,163*l.* (*Financial Reform*, p. 262, 4th edit.) 'The operation of the superannuation, the grant of retired allowances, the naval and military pensions granted for good services, the pensions granted by the 57 George III., c. 65, for persons who have occupied high political offices, and the pensions for diplomatic and consular services, have to a great extent superseded one of the original purposes of the Pension List. These acts have also substituted a strictly defined and regulated system of reward, for a system which depended on the arbitrary selection of the crown or the recommendation of the existing government, exposed to the bias of party or personal considerations.' (*Report on Pensions*, No. 913, sess. 1838.) Sir Henry Parnell, in chapter xii. of his 'Financial Reform,' shows that there are many abuses to be remedied in reference especially to superannuations. 'Nothing (he says) can be more extravagant and inconsistent with a proper guardianship of the public purse than the system of salaries and superannuations now in operation. The salaries are so much higher than they ought to be, that every officer and clerk has sufficient means of making a provision for infirmity and old age. But notwithstanding this fact, as to the sufficiency of salary, in the true spirit of profusion a great superannuation allowance has been added.' In 1830 there were nearly one thousand officers in the public service, with salaries of 1000*l.* a year and upwards, enjoying amongst them 2,026,374*l.*; and of these there were 216 persons whose salaries averaged 1422*l.*; and yet from the passing of the Superannuation Act in 1810 till 1830, the charge for civil superannuation was increased from 94,340*l.* to 480,081*l.* It was stated in the Third Report of the Finance Committee (sess. 1828), that in not a few cases persons obtained superannuations, as unfit for the public service, who enjoyed health and strength long afterwards, and discharged the active duties of life in private business. In 1831 the treasury established some very important restrictions relative to superannuation allowances, which are given in a Parliamentary Paper (No. 190, 2nd session, 1831).

For an account of pensions under the French monarchy the reader may refer to the *Encyclopédie Méthodique* (section 'Finances').

PENSIONARY, GRAND, was the name generally given to the first magistrate of the state or republic of Holland, which was a member of the confederation of the Seven United Provinces of the Netherlands. The Pensionary was the president of the council of the states or legislature of Holland, and he was at the same the first minister of the republic, transacted business with foreign powers, and like the Avoyer of Bern and other Swiss cantons. He was elected for five years, but was generally confirmed indefinitely, and often for life. He was also in virtue of his office the perpetual deputy of the state of Holland to the assembly of the states-general of the United Provinces, of which he was a most influential member, in consequence of the superior importance of the province of Holland. His name was derived from the pension which was attached to his office. He was also styled advocate-general to the states of Holland. The individual chosen for this high office was a person well versed in the science of the law, and he is styled by Grotius 'Adsessor Jurisperitus.' The various towns of Holland and Zealand had also each their pensionary, or chief municipal magistrate. [Barneveldt, Johan van Olden.]

PENTACHORD, an ancient Greek musical instrument, which had, as the word implies, five strings. The term also signified a scale of five sounds.

PENTA'CRINUS. [ENCRINITES.]

PENTADESMIS BUTYRA'CEA is a tree found in Sierra Leone, from which a fatty substance is obtained, which has given rise to its name of the Butter and Tallow Tree. It has an ovate fleshy fruit, about as large as citron, and its stamens are collected into five parcels, whence its botanical name. Little more is known of it than that it belongs to the natural order Guttiferæ or Clusiaceæ.

PENTALA'SMIS. [CIRRIPEDA, vol. viii., p. 207.]

PENTA'LEPAS. [PENTALASMIS.]

PENTATEUCH (Πεντάτευχος, from πέντε, 'five,' and τεῦχος, 'a volume') is the Greek name of the first five books of the Old Testament, which are called in Hebrew תּוֹרָה, *the law*. The Hebrew copies of the Pentateuch form one volume; the division of it into five books is first mentioned by Josephus, and seems to have been made either by the Septuagint translators, or before their time, and after the return of the Jews from Babylon.

The first, second, fourth, and fifth books of the Pentateuch have been treated of under GENESIS, EXODUS, NUMBERS, and DEUTERONOMY.

The third book is called Leviticus (Λευιτικόν), from its treating chiefly of matters pertaining to the priests, the sons of Levi. In Hebrew it is called, from its initial word, וַיִּקְרָא (*and he called*), or by the Rabbins תּוֹרַת הַכֹּהֲנִים (*the law of the priests*), and תּוֹרַת הַקָּרְבָּנוֹת (*the law of the sacrifices*). From the last verse of it (chap. xxvii. 34) we learn that it was written by Moses while the Israelites were encamped before Mount Sinai (compare *Numb.*, xxxvi. 13). The space over which it extends is the first month of the second year after the Exodus, B.C. 1490 (compare *Exod.*, xl. 17, with *Numb.*, i. 1). The twenty-seven chapters of which it consists may be divided into four parts, as follows:—1. The laws concerning sacrifices, including the burnt offerings (chap. i.), the meat-offerings (chap. ii.), the peace offering (chap. iii.), the offering for sins of ignorance (chaps. iv., v.), and the trespass offering for sins done knowingly (chaps. vi., vii.). 2. The institution of the priesthood, including an account of the consecration of Aaron and his sons, and of the punishment of Nadab and Abihu (chaps. viii.-x.). 3. The laws concerning clean and unclean animals, purifications, and expiatory sacrifices, including also sundry other enactments (chaps. xi.-xxii.). 4. The laws concerning sacred festivals, vows, things devoted, and tithes (chaps. xxiii.-xxvii.). Though the ordinances of this book were manifestly intended solely for the Jews, as is evident from their own nature, yet it contains matter of the highest import to Christians, inasmuch as the New Testament teaches that the rites of the Jewish sacred law were all or nearly all typical of the truths of Christianity; this is especially shown by St. Paul in his *Epistle to the Hebrews*, an epistle which would be almost unintelligible without the light thrown upon it by the book of *Leviticus*.

With regard to the Pentateuch in general, it has never been doubted, till at a recent period, that Moses was its author. The following are the chief arguments for its genuineness:—1. It is repeatedly asserted in the book itself that Moses was the author, and that he wrote it at the command of God. This assertion is made with regard to the whole book (*Deut.*, i. 5; xxxi. 9-13, 22, 24-26), and to separate parts of it (*Exod.*, xvii. 14; xxiv. 4, 7; xxxiv. 27; *Numb.*, xxxiii. 1, 2). And in the recapitulation of the law which Moses makes in the book of *Deuteronomy*, he frequently speaks of 'the law,' 'this law,' 'the book of the (or this) law,' 'the book of religion;' by which expressions we cannot fairly understand anything except either the whole Pentateuch, or that part of it which was already composed (*Deut.*, i. 5; iv. 44-45; xvii. 18, 19; xxviii. 58-61; xxix. 19, 20, 27, 29; xxx. 10). 2. In all ages of the Jewish history, from the time of Joshua downwards, the Pentateuch was received as the divinely inspired composition of Moses. Thus we read repeatedly in the Old Testament of 'the law,' 'the law of Moses,' 'the law of Jehovah,' 'the law which God gave by Moses,' 'the book of the law.' (*Josh.*, i. 7, 8; xxiii. 6; xxiv. 26; 1 *Kings*, ii. 3; *Psalms*, i. 1; and many other passages, which are collected in Rosenmüller's *Scholia*, and Jahn's *Introduction*.) Besides these direct testimonies, the existence and authority of the Pentateuch among the Israelites are proved by the fact that the institutions which it contains were always observed as the laws of their and that the sentiments of the Psalmists, the maxims of *Book of Proverbs*, and the reproofs and exhortations prophets, are all exactly in agreement with the sp those institutions. 3. The internal evidence is stro favour of Moses being the author. The language of book of *Deuteronomy* is that of an aged man addres people whom he had governed for forty years, appe their past experience, and speaking with all the earne of a man on the verge of death. If these characteris of any weight to show that the speaker and the wri this book were the same, then we are supplied with an a ment for the genuineness of the *whole* Pentateuch, f book of *Deuteronomy* supposes the previous compo *Exodus*, *Leviticus*, and *Numbers*, as these do that of Ge The information contained in the Pentateuch on jects of history and geography (especially with refere Egypt and Arabia), on natural history, diseases, the and military science, agrees with all the notions we form of the state of things at that remote period, and with we should expect from a man who, like Moses, had liberally educated at the Egyptian court, and had be gaged for forty years in leading a whole nation thro wilderness. The language of the Pentateuch is the antient known form of Hebrew; the assertion that its ference from the later Hebrew is far less than the of so great a time would necessarily cause in any lan is untrue. The style of the songs which are conta it possesses that plain sublimity which generally ch terises the first stage of a nation's poetry. The style narrative is better than that of any other Hebrew as we might expect from a highly educated man Moses; and it is not more varied than can be acc for by the different subjects treated of, and the inter at which the different parts were written. The arr ment of the matter is not that which would be a by a person digesting into one book previously ex tales and laws, but it is such as we might expect fr exposed to frequent interruptions in his work, and w corded each event as it occurred, which answers to the sition of Moses. The selection of the materials ap to have been made on the principle of recording things which were connected with the legislation w was the chief work of Moses, while of the laws thems some are repeated more than once, and others altered course of the work; all indicating that the legislator historian were the same person.

It is true that there are passages in the Pentateuch w could not have been written by Moses. But there is ficulty in explaining these passages as interpolati serted by a copyist with a view to make the meaning clearer. The following passages have bee in this class; but some of them may be explained wise:—*Deut.*, i. 1-4; iv. 44-49; *Exod.*, vi. 13-2 xi. 1-3; *Deut.*, ii. 10-12, 20-23; iii. 9, 11, 13-14; *Numb.*, xxxii. 41; *Deut.*, iii. 14; *Numb.*, xii. 3. T may be added the 34th chapter of *Deuteronomy*, wh it contains an account of the death and burial of M was not written by himself. In some parts however narratives, Moses appears to have made use of pre existing documents, especially at the beginning of of Genesis. [GENESIS.]

An account of the institutions recorded in the teuch has been given under MOSES.

(Rosenmüller, *Scholia in Vet. Test.*, vol. i. P *Pent.*, and others quoted by him; Jahn, *Introd Sac. Vet. Foed.*; Graves's *Lectures on the Pentat* Marsh's *Authenticity of the Five Books of M cated*; Horne's *Introduction*, vol. i, pp. 46-61.)

PENTATEUCH, THE SAMARITAN. The P teuch was the only part of the Old Testament w Samaritans received, and as, from feelings of mosity, they held no intercourse with the Jews, of the Pentateuch were preserved indepe Hebrew copies. The Samaritan Pentateuch is by several antient writers, but it was unknown in times till copies were obtained from the east by Arc Usher and Pietro della Valle. It was print copy procured by the latter in the Paris Poly nus, from which it was reprinted in Walton's P was also edited by Dr. Blayney in Hebrew cha Oxford, 1790. The original is in the Samarita Hebrew character.

The Samaritan Pentateuch is quite entitled to rank with the Hebrew as an independent source for settling the sacred text. In some places it gives readings manifestly superior to those of the Hebrew. In many passages in which it differs from the latter, it agrees with the Septuagint. Its chronology differs from that of the Hebrew Pentateuch. (Hales', *Analysis of Chronology*, vol. i., p. 272.) In *Deut.*, xxvii. 4, the Samaritan differs from the Hebrew by having Ebal for Gerizim, and vice versa. This has been regarded as an intentional corruption made for the purpose of flattering national prejudices. But Dr. Kennicott has shown good reasons for preferring the Samaritan to the Hebrew in this case. (*Diss.* ii., p. [illegible].)

PENTECOST, one of the three great Jewish feasts, so called because the day on which it began was the fiftieth (ἡ πεντηκοστή) from the second day of the Passover. It was also called the Feast of Weeks, from its falling at the end of a series of seven weeks, reckoning from the Passover, and also the Feast of the Harvest. It was a feast of thanksgiving for the harvest, at the end of which it fell, and among the sacrifices appointed for it were some of the first fruits of the harvest. This festival lasted eight days. The laws relating to it are contained in *Exod.*, xxiii. 16; xxxiv. 22; *Levit.*, xxiii. 15-21; *Numb.*, xxviii. 26-31; *Deut.*, xvi. 9-12.

PENTLAND FRITH. [CAITHNESS; ORKNEY ISLANDS.]

PENTOGRAPH. [PANTOGRAPH.]

PENTREMITES. [ENCRINITES.]

PENUMBRA (incomplete shadow), that portion of space which, in the eclipse of a heavenly body, is partly, but not entirely, deprived of its light. In a solar eclipse, as long as any part of the sun is visible, the parties observing are in the penumbra, and not in the umbra, or complete shadow.

PENZANCE, a corporate town in the parish of Madron, in the hundred of Penwith, in the county of Cornwall, 282 miles from the Post-office, London, by the south-western railway to Basingstoke, and from thence, by road, through Andover, Salisbury, Dorchester, Exeter, and Launceston. It is the most westerly town in England.

Penzance received a charter for a market and a fair, A.D. 1332, and was incorporated by charter of James I., A.D. 1614. It was burnt by the Spaniards, who landed at Mousehole, a short distance south of the town, A.D. 1595, and was plundered A.D. 1646, by the parliamentary troops under Fairfax, on account of the predilection shown by the townsmen for the royalist cause.

The town is situated on the north-western shore of Mount's Bay, and consists of several streets converging to the market-place, and of some smaller streets or lanes connecting them. The town has much increased of late years, and many of the houses are of modern erection, neat, and commodious. The number of inhabited houses in 1831 was 1264, of uninhabited 90, and 46 building. At the time of the Report of the Commissioners of Municipal Corporation Boundaries, more than 1500 houses were assessed to the poor-rate. The shops are numerous and good; the best are in the market-place. There is an episcopal chapel, with a small endowment; several dissenting places of worship, and a Jews' synagogue. The population has doubled during the present century; in 1831 it was 6563, and may be now probably estimated at from 7000 to 7500. The trade consists in the export of tin, copper, earthenware, clay, potatoes, barley, pilchards and other fish; and in the import of timber, coals, hemp, tallow, &c. A large proportion of the tin produced in Cornwall is shipped at Penzance. The pilchards are brought in by the fishermen of Mousehole and other places on the shore of Mount's Bay. There are a quay and pier near the southern end of the town, the dues upon which bring in a yearly revenue of 1000*l.* to the corporation. There are two weekly markets, one of them a considerable corn market, and three yearly fairs. Some woollen yarn and coarse woollen cloth are manufactured.

The climate of Penzance is very mild, and the place is consequently visited on that account by invalids suffering from pulmonary complaints.

The council, under the Municipal Reform Act, consists of six aldermen and 18 councillors. The borough boundary forms a semicircle round the town, having the market-place for its centre, and a radius of half a mile. The Boundary Commissioners recommend an extension of the limits. The borough is divided into two wards.

The borough has a commission of the peace. A Court of Record for the hundred of Penwith is held here every fortnight for personal actions not exceeding 50*l.* Quarter-sessions are held, and petty sessions every week. There is a small gaol, having two wards, one for men and one for women, each comprehending a yard and several cells, with a small treadwheel in a separate yard; but there is neither chapel, infirmary, nor bath.

The annual value of the chapelry of Penzance is 180*l.*; it was, before the Municipal Reform Act, in the gift of the corporation.

There were in the chapelry, in 1833, an infant-school, with 25 boys and 17 girls; an endowed grammar-school, with 12 boys; a school of industry, with 74 girls; two charity-schools, with 124 boys and 97 girls; a Jews' school, with 10 children; and thirty-eight other day-schools, with 1014 children of both sexes; and five Sunday-schools, with 802 children.

The church, which was rebuilt a few years ago, and the new town hall, both constructed of hewn granite, are great ornaments to the place. The latter building is surmounted by a handsome cupola, and its eastern front, consisting of a pediment supported by four noble columns, is a striking object. The taste of the inhabitants for scientific and literary pursuits is shown by their possessing a good public library, a Society of Natural History, and an Horticultural Society. This place is also the seat of the Royal Geological Society of Cornwall, whose museum contains one of the best collections of minerals in England.

PEONY. [PAEONIA.]

PEPAGO'MENUS, or more properly DEMETRIUS PEPAGOMENUS (Δημήτριος ὁ Πεπαγωμένος), one of the latest of the Greek physicians, is the author of a short treatise on the Gout, which is still extant. Nothing is known of the events of his life, but as his work was composed at the command of the emperor Michael Palaeologus, it must have been written between the years A.D. 1259 and 1282. 'This discourse,' says Freind (*Hist. of Physic*, vol. i.), 'though containing little extraordinary, and being collected out of other writers, chiefly Alexander, of whose work the eleventh book treats of this disease at great length, yet is far from deserving the character which M. Musurus, his translator, bestows upon the author (by name unknown to him), of *ineptus et elinguis*, &c., as if he could not express what he meant.' It consists of forty-five short chapters, besides the preface and conclusion, and, in the opinion of Sprengel (*Hist. de la Méd.*), does not deserve to be classed among the numerous worthless productions of the modern Greeks. He says that the author certainly does not depart from the system of Galen, but that his theory of the disease is more reasonable, and more in accordance with the observations of the moderns than that of most of his successors. He sets out with a true and precise axiom, viz. that the gout is a disease affecting the whole organized frame, and produced by weakness of the digestive organs and excesses in the matter of diet, &c. (cap. 7). The morbid principle, which is the result, is directed by nature towards the weakened articulations (cap. 8). Hence it follows that sobriety and temperance are the only means of preventing the disease (cap. 10). With respect to the cure he seems chiefly to have trusted in emetics and cathartics, and gives several prescriptions, some of which are borrowed, and others are apparently original. He particularly recommends a drastic purgative called *hermodactylus*, which is also highly praised by Alexander Trallianus (lib. xi.), and which Mr. Adams (in Barker's ed. of Lemprière, 1838) considers to be a species of *Colchicum Autumnale*, a medicine still considered by some practitioners to be almost a specific in this disease.

The treatise, περὶ ποδάγρας, 'De Podagrâ,' was first published in Latin, by Marcus Musurus, Romae, 1517, 8vo., with the title 'De Podagrâ Libellus nuper Autore e Graeco in Latinum conversus,' &c. This translation is inserted in the 'Medicae Artis Principes,' by H. Stephanus, Paris, 1567, fol. The Greek text was first published at Paris, ap. G. Morelium, 1558, 8vo., with a Latin translation (probably) by Turnebus. The last and best edition is by J. S. Bernard, Lugd. Bat., 1743, 8vo., Gr. and Lat., which is sometimes found with a new title-page, Arnheim, 1753. There is a French translation by Fred. Jault, Paris, 1573, 8vo. The Greek and Latin text is also to be found in the tenth volume of Chartier's edition of Hippocrates and Galen.

There is extant a treatise entitled [illegible], 'Dignotio Morborum in Hominibus, eorum que Curatio,' which is commonly printed among Galen's works, but which is however manifestly spurious, as the author professes himself to be a Christian. Fabricius, in his list of Galen's works, conjectures that Demetrius Pepagomenus may have been the author, but, in the opinion of Freind and Haller, there seems to be no good reason for such a supposition. In the collection of writers 'De Re Accipitrariâ et Venaticâ,' published by Nic. Rigaltius, Paris, 1612, 4to., are two treatises, which are perhaps the works of this same Demetrius. One is entitled *'Ιερακοσόφιον, ἢ περὶ τῆς τῶν ἱεράκων ἀνατροφῆς τε καὶ ἐπιμελείας*, 'Hieracosophium, sive De Accipitrum Educatione et Curatione,' containing an account of the different species of hawks, the mode of catching and training them, the diseases to which they are subject, and the remedies proper for each. The other is called *Κυνοσόφιον, ἢ περὶ τῆς τῶν κυνῶν ἐπιμελείας*, 'Cynosophium, sive De Canum Curatione,' and is sometimes attributed to Phæmon. It has been several times reprinted, but is not of much worth. He attributes madness in dogs to a worm underneath the tongue.

PEPIN D'HERISTAL (so called from a place in the kingdom of Austrasia, or Metz, called Heristal), or Pepin le Gros, was the son of Ansegisus, and grandson of Arnoul, who was duke of Austrasia in the reign of Dagobert I., afterwards bishop of Metz, and who was finally numbered among the saints. The mother of Pepin, named Begga, was the daughter of another Pepin, called Pepin the Old, or Pepin of Lander, who was Maire of the Palace under Dagobert I. and under his son Siegbert, king of Austrasia, was much respected for his personal character, and who died A.D. 640. Pepin d'Heristal became duke of Austrasia under Dagobert II., after whose death, A.D. 679, he governed the country as sovereign under nominal allegiance to Thierri III., king of Burgundy and Neustria. Thierri however became dissatisfied with Pepin, who revolted and defeated him, A.D. 690, and obliged him to recognise him as Maire du Palais, or in other words, the governor of the whole Frankish monarchy. Here begins the series of the 'Rois fainéans,' or 'do-nothing kings,' who succeeded one another as mere crowned pageants, whilst the Maire du Palais had all the real authority. Pepin ruled as such under Thierri, Clovis III., Childebert III., and Dagobert III., and thus made his authority respected, not only by the natives, but also by foreigners. He died in 714, having appointed his grandson Theodebaud to succeed him as Maire du Palais. But Charles Martel, a natural son of Pepin, was proclaimed duke of Austrasia by the acclamations of the people, A.D. 715, and in 719 he obliged Chilperic II. to acknowledge him as Maire du Palais as his father Pepin had been. [Charles Martel.]

PEPIN, king of France, called 'le Bref,' or 'the Short,' son of Charles Martel, was Maire du Palais after his father's death, under the nominal king Childeric III., for the kingdom of Neustria and Burgundy, whilst his brother Carloman governed that of Austrasia in a similar capacity. The two brothers defeated the Saxons, Bavarians, and Slavonians; and Pepin, in 744, defeated the duke of Aquitania, who had revolted. Soon after, Carloman, in a fit of devotion, gave up the government of Austrasia, and retired to a monastery at Rome, where he ended his days. All the authority was now concentrated in Pepin. What followed has been briefly and obscurely told by the chroniclers: 'King Childeric was dethroned, A.D. 750, his head was shaved (long hair was an essential appendage of royalty with the Merovingian kings), and he was confined in the monastery of Sithin, or St. Bertin, at St. Omer, and his son Thierri was sent to the convent of Fontenelle in Normandy, where he was brought up in obscurity.' (Henault, *Histoire de France*.) Eginhardt, the historian of Charlemagne, says, that 'Burckard, bishop of Wurtzburg, and the priest Fulrad, a chaplain, were sent to Pope Zacharias at Rome, to consult him concerning the state of France, in which the kings had merely the name of kings, without any royal power, and that the pope replied that it was better that he who exercised the royal authority should bear also the royal title; in consequence of which sanction, Pepin was constituted king.' And the continuator of the chronicler, Fredegarius, writing under the direction of Count Childebrand, Pepin's uncle, says, that 'by the consent of the Frankish nation, supported by the sanction of the Apostolic see, the illustrious Pepin being consecrated by the bishops and recognised by the princes, was raised to the kingdom, together with his Queen Bertrada, according to the antient usages.' We have no circumstantial account of this important event, except that
Pepin was anointed at Soissons, in March, A.D. 752, by
Boniface, bishop of Mainz, called the Apostle of Germa
before the assembly of the nation. It seems that t
ceremony of anointing the new king was introduced o
this occasion, having been unknown under the first or Merovingian dynasty. (Sismondi, *Histoire des Françai*.)

Sismondi thinks, with some degree of plausibility, th
this accession of a new family to the throne of the Fran
was not a mere change of dynasty, nor the usurpation of o
family over another, but that it was really a national re-
lution effected by the German population of Austrasia und
their leaders Pepin d'Heristal, Charles Martel, and h
son Pepin, who conquered Neustria and the other provin
of antient Gaul, and placed their own dynasty on t
Frankish throne. During the two centuries and a h
which had elapsed since the first conquest of Gaul by t
Franks under Clovis, the conquerors had become mixed
with the Gallo-Roman population, had adopted their la-
guage, manners, and effeminacy, and the original famil
the Franks had almost entirely disappeared in Neus
Aquitania, and Provence. But Austrasia, which exten
far on the right bank of the Rhine, had remained Germ
The family of Pepin led the Austrasian bands into the
of Gaul, which thus received a fresh infusion of Ge
manners, language, and military spirit. Pepin le Bre
order to conciliate the conquered Neustrians, raised C
deric III., of the old dynasty, to the throne, but this pag
was in reality the king of the conquered, while Pepin r
tained all the authority in his hands. The Neustr
looked upon the Austrasian bands as strangers and enem
When Pepin found that he could dispense with the pup
king, he put him aside with the sanction of Rome.

Pepin was grateful to the see of Rome, and when
Stephen III., Zacharias's successor, applied to him for as
ance against the Longobards, he marched with an army
Italy, defeated Astolphus, and made him promise to gi
the Exarchate and Pentapolis to the Roman pontiff. [Pa
State.]

Pepin waged successful wars against the Saxons, the B
varians, and other German nations; he defeated the
of Aquitania, and reunited his duchy to the domains of
crown; he favoured the clergy, and fixed the annual ger
assemblies of the Frankish nation for the month of M
He died of the dropsy, at St. Denis, in September, 7
54 years of age, in the 17th year of his reign. His
Charlemagne succeeded him as king of the Franks.

PEPIN, son of Louis le Débonnaire, and grandson
Charlemagne, was made by his father king of Aqui
A.D. 817, revolted repeatedly against his father, and d
838 or 839. The emperor disinherited Pepin's childre
their father's kingdom, and gave it to his own son Ch
the Bald.

PEPIN, Lake. [Mississippi, River.]

PEPO, a Latin term used by botanists to express
kind of fruit of which the gourd is the type. It is an u
seed-vessel, filled with pulp enclosed within a hard per
and furnished with parietal placentæ. It is a berry w
hard shell.

PEPPER. [Piper; Pimento.]

PEPPERMINT. [Mentha Piperita.]

PEPUSCH, JOHN CHRISTOPHER, an emi
musical theorist and composer, was born in 1667, at B
in which city his father was minister of a Protestant
gregation. At the early age of fourteen his talents attr
the notice of the Prussian court, in which he held som
pointment till he attained his thirtieth year, when,
eye-witness of a murderous act of tyranny perpetrated
Frederick I., he resolved to quit his country. He
visited Holland, where he remained upwards of a year;
proceeded to London, and about 1700 was engaged to
the harpsichord at Drury-lane theatre, and, it is supp
assisted in preparing for the stage *Thomyris*, as w
other operas. At the same time he commenced his inq
concerning the music of the antients, for which pursu
knowledge of the learned languages and studious h
highly qualified him. In these investigations he rec
no inconsiderable aid from his friend De Moivre,
mathematician. Though he had persuaded himself
the music of the Greeks was far superior to anything
the moderns were capable of producing, yet he did not h
tate to compose much, and was successful; though
one of his many works is known to the present age—

cantata, 'See from the silent grove Alexis flies,' which has always been, and probably always will be, admired by every person of true taste.

In the year 1710 this active and indefatigable musician was one of the founders of the *Academy of Antient Music*, which was formed on so judicious a plan that it subsisted upwards of eighty years. In 1712 he, together with Handel, was engaged by the Duke of Chandos (*Pope's Timon*) to compose for the chapel at Cannons. The next year he was admitted by the university of Oxford to the degree of doctor in music. In 1724 he was persuaded by Dr. Berkeley to join in the visionary scheme for establishing a college at the Bermudas, and actually embarked for the purpose; but the ship being wrecked, the project was speedily abandoned. He now entered into the matrimonial state with the celebrated singer Signora Margarita de l'Epine, who brought him a fortune, acquired by her profession, of ten thousand pounds. This addition—great in those days—did not induce him to relax in his pursuits: he selected and adapted, with admirable skill, the music for *The Beggar's Opera*, for which he composed the overture. In 1731 appeared his *Treatise on Harmony*, which long continued a standard work, and is still read by students who are wise enough to make themselves acquainted with the best writers on the art. In the year 1737 he was chosen organist of the Charter House, an appointment he solicited more for the sake of the apartments and the learned and agreeable society it afforded than with any pecuniary view. Three years after this he lost his wife; his only son having died some time before. He now found relief in his studies, to which, and in giving instructions to a few favourite pupils, he devoted himself wholly. In 1746 was read before the Royal Society his account of the *Antient Genera*, which appears in volume 44, No. 481, of the 'Philosophical Transactions;' previous to which however he had been elected a fellow of that learned body. Dr. Pepusch died in 1752, and was buried in the chapel of the Charter House.

PEPYS, SAMUEL, secretary to the Admiralty in the reigns of King Charles II. and King James II., was born February 23, 1632, of a family which had some pretensions to gentility, though he himself confesses it had never been 'very considerable.' His father, John Pepys, was a citizen of London, where he followed the trade of a tailor.

We learn from his diary that Pepys passed his boyish days in or near London, and was educated at St. Paul's school, where he continued till 1650, early in which year his name occurs as a sizar on the boards of Trinity College, Cambridge. Previously however to his going to reside in that university, March 5, 1650-1, he had removed to Magdalen College. How long he continued at Cambridge, or what were his academical pursuits, we are not informed. In 1655 he married Elizabeth St. Michel, a girl of fifteen. The consequences which might naturally have been expected to attend such an imprudent step were averted by the kindness of a relation, Sir Edward Montagu (afterwards earl of Sandwich), who gave the young couple an asylum in his family. In 1658 he accompanied Sir Edward Montagu in his expedition to the Sound, and on his return became a clerk in the Exchequer. Through the interest of the Earl of Sandwich however, he was soon nominated clerk of the acts of the navy, and he entered on the duties of his office early in June, 1660. That was the commencement of his connection with a great national establishment to which his diligence and acuteness were afterwards of the highest service. In this employment he continued till 1673; and during those great events, the plague, the fire of London, and the Dutch war, the care of the navy in a great measure rested upon him alone. The Duke of York being lord-high-admiral, Pepys was by degrees drawn into a close personal connection with him, and as he enjoyed his good opinion, he had also the misfortune to experience some part of the animosities with which he was loaded during the time of 'The Popish Plot.' The absence not only of evidence, but even of ground of suspicion, did not prevent Pepys being committed to the Tower (May, 1679) on the charge of being an aider and abettor of the plot, and he was for a time removed from the Navy Board. He was afterwards allowed, with Sir Anthony Deane, who had been committed with him, to find security in 30,000*l.*; and in February following, upon the withdrawal of the deposition against him, was discharged. He was soon replaced in a situation where his skill and experience could not be dispensed with, by the special command of Charles II., and was afterwards made secretary of the admiralty, which office he retained till the Revolution. James II. was sitting to Sir Godfrey Kneller for a portrait designed as a present to Pepys, when the news of the landing of the Prince of Orange was brought to him. The king commanded the painter to proceed and finish the portrait, that his friend might not be disappointed.

Upon the accession of William and Mary, Pepys lost his official employments; but he retired into private life without being followed either by persecution or ill will. He died May 26, 1703, and was buried in the church of St. Olave, Hart Street.

Pepys had an extensive knowledge of naval affairs. He thoroughly understood and practised music; and he was a judge of painting, sculpture, and architecture. In 1684 he was elected president of the Royal Society, and held that honourable office two years. As a patron of learning, it may be sufficient to say that he contributed no fewer than sixty plates to Willughby's 'Historia Piscium.'

To Magdalen College, Cambridge, he left an invaluable collection of manuscript naval memoirs, of prints, and antient English poetry, which has often been consulted by critics and commentators, and is indeed unrivalled in its kind. One of its most singular curiosities is a collection of English ballads in five large folio volumes, begun by Selden, and carried down to the year 1700. Percy's 'Reliques' are for the most part taken from this collection.

Pepys published 'Memoirs relating to the State of the Royal Navy of England for ten years, determined December, 1688,' 8vo., Lond. 1690, and there is a small book in the Pepysian library entitled 'A Relation of the Troubles in the Court of Portugal in 1667 and 1668, by S. P., Esq.,' 12mo., Lond. 1677, which Watt, in his 'Bibliotheca Britannica,' ascribes to Pepys.

His 'Memoirs' comprising his Diary from 1659 to 1669, and a selection from his private correspondence were edited by the present Lord Braybrooke, in 2 vols. 4to., Lond. 1825, republished in 5 volumes 8vo., Lond., 1828, from which and from Chalmers's account of him, most of the particulars in this notice have been derived.

PEPYSIAN LIBRARY. [MAGDALEN COLLEGE, CAMBRIDGE.]

PERÆA. [PALESTINE.]

PERAMBULATOR, an instrument in general use for measuring distances on roads, for settling disputes concerning the charges of the drivers of hackney-carriages, and for other purposes. It consists principally of a wheel upon which it runs, and an index which shows the number of turns of such wheel reduced into miles, furlongs, poles, and yards.

The carriage or stock is made of wood, and is about 3 feet long. At one end is a handle for the person who uses it, and the other is furnished with sockets in which the axle of the wheel turns: this end of the stock has the centre part removed, by which are left two arms between which the wheel works. Upon the stock and just in front of the handle is the dial-plate, with its two hands by which the distance is registered. The wheel is 8 feet 3 inches, or ½ pole, in circumference. Upon one end of the axis of this wheel is a small pinion, which works into a similar pinion at the end of a rod which passes up the stock or carriage to the works beneath the dial-plate. Motion is communicated by means of this rod to a worm or micrometer screw, which turns once round for each revolution of the carriage wheel of the perambulator. This worm works into a wheel of 80 teeth, which is moved forward one tooth for every ½ pole, and carries a hand or index, which makes one revolution for 40 poles or one furlong. On the axis of this wheel is a pinion of 8 teeth, which works into a wheel of 40 teeth, and on the axis of this second wheel is a pinion of 10 teeth, which moves a wheel of 160 teeth. This last wheel carries another hand, which makes one revolution for 80 of the former. These hands are arranged in the same manner as the hour and minute hand of a watch, so that the three circles on the dial-plate are all concentric. The first of these circles is divided into 220, and the second into 40, the number of yards and poles contained in a furlong; the figures on these circles are read off by the first-mentioned index, that which is attached to the wheel of 80 teeth. The third circle is divided into 80, the number of furlongs in 10 miles, and to this circle belongs the index attached to the wheel of 160 teeth. The distance is ascertained by reading off the figures in the reverse order in which the circles are given above: divide the number on the first circle by 8, and you will have the distance required in miles, furlongs, poles, and yards.

The instrument is furnished with a stop or strap, so that after the distance is measured, the perambulator may be conveyed without the index being altered.

Unlike the pedometer, it requires no regulating, and the only risk of its giving the distance incorrectly, if well constructed, is in passing over rugged and uneven roads, which will of course cause the index to show more than the true distance. In general however, for short distances, this error is very trifling.

When about to commence a measurement, the wheel should be turned round until the first-mentioned index points to 220 on the circle of yards. Some are provided with a click and racket, by which this may done with much less trouble than by the wheel.

There are other instruments for the same or similar purposes, bearing different names, as *waywiser* and *odometer;* but the construction of all of them is very similar.

Waywiser is the name generally given to that form of the instrument which is applied to a carriage, in which, by a slight adaptation to one of the wheels of the carriage, the instrument is made to register the number of turns of such wheel, in the same manner as the perambulator.

PERAME'LES. [BANDICOOT; MARSUPIALIA, vol. xiv., p. 437; and see further Professor Owen's paper 'On the Osteology of the Marsupialia' (*Zool. Proc.*, 1838).]

PERCEPTION is that power or act of the mind by which it holds communication with the external world. It is distinguished from *conception* by the circumstance that its objects are in every instance supposed to have an actual existence. We may conceive things that have no reality, but we are never said to perceive such things. Perception differs from *consciousness* in that it takes cognisance only of objects without the mind. We *perceive* a man, a horse, a tree: when we think or feel, we are *conscious* of our thoughts and emotions. It is further supposed in perception that the objects of it are present. We can *remember* former objects of perception, but we do not perceive them again until they are once more present. Besides the sense which has been explained, the term perception is sometimes analogically employed in common speech in reference to truths the evidence of which is certain. Thus we may perceive the truth of a mathematical proposition. But Mr. Hume is perhaps the only writer of eminence who designedly applies the word in a metaphysical disquisition with a meaning different from that which has been here assigned to it. By him it is applied indiscriminately to all the operations and states of the mind; passions being designated perceptions, and the acts of memory and imagination converted into so many acts of perception. Such latitude of phraseology confounds under one general name things essentially distinct, and tends to introduce vagueness and inaccuracy into a department of philosophical investigation where definiteness and precision are peculiarly indispensable.

The distinction between things *perceived* (αἰσθητά) and things *conceived* (νοητά) was familiar to the Greek philosophers and to their Latin expositors, of whom Cicero expresses the former class of things by the phrases 'quæ sunt,' 'quæ cerni tangive possunt;' and the latter by the phrases 'quæ tangi demonstrarive non possunt, cerni tamen animo atque intelligi possunt,' and gives examples of each. (*Top.*, v.)

The perceptive faculty is exercised through the instrumentality of the senses. We see by means of the eye, and hear by means of the ear, and so in reference to the other senses. An individual in whom these organs are wanting or defective, will either not perceive at all, or perceive imperfectly. In order to perception it is requisite that an impression should be made on the organ of sense, either by the direct application of the object, or through some medium that communicates with the object and the organ. Thus an immediate application is necessary with regard to the senses of taste and touch: but only an intermediate one with regard to those of sight, hearing, and smell. The impression made on the organs of sense affects the nerves, and is by them conveyed to the brain. The necessity of this communication is ascertained by observation. If the nerve appropriated to any organ be cut or tied hard, no perception takes place; and the same result is noticed in certain disordered conditions of the brain, even though the organs of sense and the nerves perform their respective functions. When however the conditions that have been specified are complied with, perception ensues.

Various theories have been formed to explain the functions of the nerves and brain in connection with perception. It was imagined by the antients that the nervous fibres are tubular, and filled with a subtile vapour named animal spirits; that the brain is a gland by which this æthereal fluid is secreted; and that by means of it the nerves perform their office. (Reid, *Essay* ii., ch. 3.) Des Cartes, who adopted this hypothesis, has described with great minuteness how all mental operations and movements are accomplished through the agency referred to. Dr. Briggs, Newton's instructor in anatomy, was the first who proposed a new doctrine on this point. He maintained that the nerves operate by vibrations, like musical chords, and thus conduct impressions to the brain. Newton himself (*Opt.*, qu. [illegible]) appears to have been inclined to a notion of this kind, and the suggestions relating to it thrown out by him as a query were afterwards amplified and defended by Hartley. The latter supposed that 'external objects impressed on the senses occasion, first in the nerves on which they are impressed and then in the brain, vibrations of the small and, as one may say, infinitesimal medullary particles;' and that these vibrations are excited, propagated, and kept up partly by the ether, that is, by a very subtile elastic fluid, partly by the uniformity, continuity, softness, and active powers of the medullary substance of the brain, spinal marrow, and nerves.' (*Observations on Man*, part i., prop. 4.) Both Des Cartes and Hartley believed that by the action of the nerves in the manner described by them, images of external objects were formed in the brain.

It is scarcely necessary to remark concerning these hypotheses that they are totally destitute of foundation. A sound theory must assign real and not imaginary causes for the phenomena which it professes to explain; and such causes must have a manifest competency to the effects ascribed to them. But the hypotheses in question entirely want both of these essentials. Who can prove the existence of the animal spirits of Des Cartes, or the vibrations of Hartley; or, granting their existence, who can show any correspondence between them and the formation of images in the brain? All we can affirm with certainty respecting the means of perception is, that, under certain circumstances, that is, when an impression is made on the bodily organ and communicated by the nerves to the brain, perception takes place. The impressions so communicated are the occasions of the mind perceiving, but we can assign no reason why it should do so under these circumstances invariably, and not under any other, further than that such is the constitution of our nature.

If the act of perception be examined, it will be found that we obtain by it a certain amount of information respecting the object perceived. We discover that it has particular qualities, as for example, that it is extended, that it has figure, that it is hard or soft, rough or smooth, &c. The notion thus formed may vary in respect of distinctness in all possible degrees. In the light of twilight a body is discerned more obscurely than in the full light of noon day, and more obscurely still in proportion as the darkness deepens. The notion we get of an object by perception is accompanied by an irresistible and immediate conviction of its real existence. An object may indeed be perceived so indistinctly as to leave us in doubt whether it be real or not. If it be very distant, or involved in darkness, this may happen. But when it is plainly perceived, there is, along with the perception, a perfect conviction of its reality. We can no more doubt of its existence than we can of our own. And this conviction is immediate. It is not the result of a process of reasoning founded on our perceptions, but inseparably connected with them, and as instantaneous as the assent rendered to axiomatic truths. It may be also remarked that the belief in the existence of the objects of perception is not more immediate and deeply rooted than is the belief that they exist externally to us. They do not seem to have their place in the mind itself, but to exist independently of it altogether. These statements accord with the universal experience of mankind, and may be verified by all who choose to bestow the slightest attention on the intimations of consciousness.

It would be a tedious as well as a useless task to dwell minutely on the numerous theories that have been framed of perception. In certain important particulars nearly all of them coincide; while in others, equally if not more important, they are for the most part at variance.

Democritus taught that perception was the result of the impressions made on the organs of sense by images (εἴδωλα which constantly emanated from bodies, and varied according to the conformation of their organs. (Plut., *Plac. Phil.* l. iv. ch. 8, &c.)

Plato, in the seventh book of his 'Republic' (ad init.) illustrates the manner in which we perceive objects by the figure of a cave, in which men lie bound, so that they can turn their eyes only to one part of it, where rays from a distant light stream in, and shadows of bodies, supposed to pass between them and the light, are beheld, the bodies themselves being invisible. He thus conceived that we perceive only the shadows of things, and not things themselves.

This opinion of Plato was substantially the same with that of his scholar Aristotle, and of the Peripatetics generally. Aristotle (*De An.*, l. iii. c. 2, 3) taught that as the senses cannot receive material objects themselves, they receive their images. These images are the only objects of perception in the mind. As impressed upon the senses, they are termed sensible species; more spiritualised, they become objects of memory and imagination, and are termed phantasms; still further refined, so as to be objects of science, they are named intelligible species.

The theory of Epicurus was little other than a modification of that of Aristotle. He supposed that bodies are continually sending off from their surfaces slender films or spectres of such subtlety that they easily penetrate by the senses to the brain. (Lucret., l. iv. v. 34, 46, &c.)

Locke employs an illustration of the manner of perception that appears to have been borrowed from that of Plato:—'Methinks,' he says, 'the understanding is not much unlike a closet wholly shut from light, with only some little opening left to let in external visible resemblances, or ideas of things without. Would the pictures coming into such a dark room but stay there, and lie so orderly as to be found upon occasion, it would very much resemble the understanding of a man in reference to all objects of sight and the ideas of them.'

The similitude of Locke, or rather of Plato, may be applied to all the systems of perception that have ever been formed, by merely substituting ideas, and, in the case of Hume, impressions, for what were anciently denominated species and phantasms. All these theories agree in maintaining that images are the only immediate objects of perception in the mind. Hume, Berkeley, and others indeed held that these are the exclusive objects; but the common hypothesis admits the existence of things of which these are but the representatives, and which we mediately discern. It may be sufficient to remark concerning these opinions, that they are diametrically opposed to the testimony of our own consciousness. Instead of informing us that images alone are the direct objects of our perception, consciousness intimates nothing regarding images at all. Unless its representations are altogether deceptive, it is not things within the mind, but things external to it, that we perceive; not images of objects, but the very objects themselves. This is testimony to which we yield instinctive credence. It is too urgent and unquestionable to be set aside by reasoning of any kind, far less by reasoning based upon certain imagined relations subsisting between matter and spirit which we are incapable of apprehending, and the application to mind of laws which apply solely to the objects of physical investigation.

One observation, intentionally deferred, remains still to be made respecting perception, namely, that it is greatly modified by habit and by the cultivation and development of the other powers. Thus the perceptions of a man and those of a child, both contemplating a piece of complex machinery, the one being aware of its principles and arrangements, the other completely ignorant of them, must in many respects considerably differ. In like manner the perceptions of a blind man, by means of those organs of sense which are unimpaired, are distinguished in many particulars from those of the individual who has never been without the faculty of vision. Numerous instances of a similar kind might easily be specified. A full account of acquired perceptions, such as those alluded to, is still a desideratum in this department of philosophical inquiry.

PERCH or **POLE**. This measure, though now mostly used as a square measure (a perch usually meaning a square perch, or a square of a perch in length and breadth), was originally a measure of length, arising out of the custom of measuring small portions of land by a staff or pole. The word *pertica*, from which it comes, means a wooden staff, and the pole with which land was measured not only differed very much in different countries, but in different parts of the same country. Ducange and his editors find records of the use, in different parts of England and France, of perches of 7½, 10 (the oldest English), 12, 15, 16, 18, 20, 21, 22, 25, and 27 feet. Here is but another instance (as in Mile and League) of the tendency of measures to lengthen. Forty perches (*quarantena*), under the name of forty-long or furlong, became a common measure of length; and a piece of land forty perches long and one deep, was called *perticata*. (Spelman, cited by Ducange.) Thus the perch and furlong, though afterwards received into the system of measures which ends with the mile, originally formed no part of it whatever. [Mile.*]

By an early statute, entitled 'Compositio Ulnarum et Perticarum,' the perch was fixed at 16½ feet, or five yards and a half; and four perticatæ (though that word is not used) were defined as an acre.

A perch is the quarter of a chain, and a square perch contains 30¼ square yards.

PERCHE, LE, a province of France, united, before the Revolution, with Maine, into one military government. It was bounded on the north by Normandie, on the north-east by the Ile de France, on the east and south by Orléanais, and on the west by Maine. It was subdivided into Le Grand Perche, or Le Haut Perche (Great or Upper Perche), of which Mortagne was the capital; Le Perche Gouet, or Le Bas (Lower) Perche, of which Montmirail was the capital; Les Terres Françaises, of which Tour-Grise-de-Verneuil was the capital; and Les Terres Demandées, or Thimerais, of which Châteauneuf-en-Thimerais was the chief town. Perche is now comprehended in the departments of Orne, Sarthe, and Eure et Loir.

Le Perche was under the government of its own counts from the year 940; but the original county was not equal in extent to the province of later times. Having fallen to the crown, the county was given with that of Alençon to Pierre, one of the younger sons of St. Louis (A.D. 1269); but these counties having on his death reverted to the crown, they were again bestowed on Charles de Valois, brother of Philippe le Bel (A.D. 1293), in whose family they long continued. In 1301 they were separated, Perche going to a younger branch of the family; but in 1404 they were again united.

In the reign of François I. the county was, on the death of the last male heir, seized by the crown, but the justice of the claim was for a while disputed. During the dispute the widow of the late count was allowed to possess the county, but it was afterwards annexed to the crown domains.

PERCIDÆ, or *Percoïdes* of Cuvier, a family of Acanthopterygious fishes, of which the common perch may be regarded as the type, that is to say, the fishes of this great group, which ought perhaps to be regarded as an order rather than a family, all more or less approach the common perch in general form: they have the body covered with scales whose outer surface is more or less rough, and the free margins of which are denticulated; the operculum and preoperculum are variously armed with spines and denticulated at the outer margin; they not only have teeth in both jaws, but the vomer and palatine bones are also furnished with them: the number of rays in the branchiostegous membrane varies from five to seven; they never fall short of the lower nor exceed the higher number. The flesh of these fishes is generally well flavoured and wholesome. They inhabit both salt and fresh water.

The first division of the Percidæ, according to Cuvier, comprises all those species which have the ventral fins placed under the pectorals, five soft rays in the ventral fins, seven branchiostegous rays, and two dorsal fins. This section includes the following genera:—

1. *Perca* proper, in which the preoperculum is denticulated; the operculum is produced behind into a flattened spine; the infra-orbitals are obscurely denticulated, and the tongue is smooth. Example, the common perch (*Perca fluviatilis* of Linnæus). (Yarrell's *British Fishes*.) Closely allied to this is the *P. italica* of Cuvier and Valenciennes, a species found in tolerable abundance in some parts of Italy; it differs from the *Perca fluviatilis* in being of a shorter and deeper form, and is destitute of the black bands. Several true perches are found in North America; species have also been discovered in Java and New Zealand: it is highly probable therefore, from the extensive geographical range of the perches proper thus exhibited, that very many species still remain to be discovered.

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* In that article [illegible] 'perticata' is erroneously written for 'pertica.'

2. *Labrax* (Cuv. and Val.) differs chiefly from the true perches in having the infra-orbitals destitute of denticulations as well as the suboperculum; the operculum (which, as well as the preoperculum, is entirely covered with scales) has two spines on the posterior part, and the tongue is furnished with minute teeth. [LABRAX.]

3. *Lates* (Cuv. and Val.), a genus also closely allied to Perca proper, in fact differs only in having the infra-orbitals more deeply denticulated as well as the humerals; large spines are observable on the angle of the preoperculum; the anterior dorsal is shorter and higher than in the perch; the tongue is smooth, as in the last-mentioned fish.

The fishes of this subgenus are usually of large size, good eating, and are chiefly found in the rivers in the warmer parts of the Old World.

4. *Centropomus* (Lacép.) includes those perch-like fishes whose operculum is produced behind, but the produced part is rounded at the apex; in the fins and denticulated preoperculum they resemble the perch. In the only species of this genus hitherto discovered the head is more pointed than in the preceding genera. [CENTROPOMUS.]

5. *Leucioperca* (Cuv. and Val.) differs from both the preceding genera in having larger sharply-pointed teeth intermixed with the ordinary small teeth, the form of the body is more elongated, and the first dorsal fin is large. The *L. Sandra*, C. and V., is found in the rivers and lakes of the north-eastern portions of Europe, and is known to the Germans by the names of Sander, Sandel, or Sandat; it is the Schil of the Austrians, and the Nagmaul of the Bavarians. A second species, the *L. Volgensis* of Gmelin, inhabits the rivers of Russia, and a third is found in the United States.

6. *Huro* (Cuv. and Val.): this genus is founded on a fish described by Dr. Richardson, which, with most of the essential characters of the perches, differs in having the opercula simple, a character in fact not found in either of the other genera here described. The species alluded to inhabits Lake Huron, and is called by the inhabitants the Black Bass: it is considered one of the best flavoured fishes of that lake.

7. *Etelis* (Cuv. and Val.): in this genus, as in *Leucioperca*, there are larger teeth intermixed with the ordinary minute ones, but here the larger teeth are confined to the jaws, and are not found intermixed with the palatine teeth, as in *Leucioperca;* the operculum is terminated by two spines, whilst in the genus just mentioned it is simple. Only one species of Etelis is known; its body is elongated, the muzzle is rather obtuse, the eyes very large, and the outer rays of the tail-fin are elongated; this fish (the *E. carbunculus*, Cuv. and Val.) is also remarkable for its brilliant red colour, and is adorned with longitudinal golden stripes. It is found in the region of the Seychelle Islands, north of Madagascar.

8. *Niphon* (Cuv. and Val.): this genus is founded on a single species found in the Japanese Sea, and is remarkable for the large spines with which the opercula are armed; the preoperculum is strongly dentated at its margin and furnished with a long and powerful spine at its angle, and the operculum has three of these large spines; the first dorsal is large, and its spinous rays are strong; the body is somewhat elongated, and the head is pointed. The authors last quoted apply to this species the name *N. spinosus*.

9. *Enoplosus* (Lacépède) is also founded upon a single species (from Australia) originally described in White's 'Journal of a Voyage to New South Wales,' in which work the fish is mistaken for a *Chætodon*, no doubt from its short, deep, and compressed form, and produced muzzle. Like the true perches, it has two dorsal fins, but these are much extended in the vertical direction; the third ray of the first dorsal is very large, and long, and the six anterior rays of the second dorsal are also much elongated; the infra-orbital is denticulated, and so is the preoperculum which is moreover furnished with a strong spine; the operculum is simple, *i.e.* destitute of spines: it is the *Enoplosus armatus* of Cuv. and Val., a fish of small size, being seldom more than eight or ten inches in length; the body is adorned with seven or eight black bands on a silvery ground: some of these bands however are abbreviated.

10. *Diploprion* (Kuhl and Van Hasselt), like the two preceding genera, contains but one species (*Diploprion bifasciatum* of the authors just quoted). This fish is of a short and high form, having a large head somewhat obtusely terminated in front; its colour is yellow; a broad black vertical mark runs through the eye, and a still broader band crosses the body. The infra-orbital is entire, the preoperculum is denticulated, and the operculum is armed with three strong spines. It is found off the coast of Java.

11. *Apogon* (Lacépède). In this genus the first and second dorsal fins are small in antero-posterior extent, and widely separated; the general form of the body is ovate, but somewhat suddenly less deep behind the second dorsal; the head is without scales, large, and obtuse in front; the scales are very large and easily dislodged; the preoperculum is denticulated. Many species of this genus inhabit the Indian seas, but that which is most generally known (the *A. rex-mullorum*) is found in the Mediterranean. It is a small fish, rarely more than five or six inches in length, and of a golden red colour, with a black spot on each side at the base of the tail-fin; there is also generally a spot of the same colour near each angle of this fin, another on the posterior dorsal, and a brown tint between the eye and the tip of the muzzle. Besides these larger blotches, the body is marked with minute black specks.

12. *Cheilodipterus* (Lacépède) has larger pointed teeth mixed with the ordinary ones; the preoperculum is denticulated, and the operculum is entire. [CHEILODIPTERUS.]

13. *Pomatomus* (Cuv. and Val.). In this genus the dorsal fins are small in antero-posterior extent, and widely separated; the second dorsal fin and the anal fins are thick and covered with small scales; the body is somewhat elongated and thick; the head is large, and the eyes very large; the opercula are covered with scales; those on the body are large and easily dislodged.

Only one species of this genus is known, the *Pomatomus telescopium* of Risso, and this is said to be exceedingly rare, living, it appears, in very deep water. Risso states that at Nice, where the species has been found, only two specimens were taken during thirty years. The individual to which MM. Cuvier and Valenciennes's description is taken was about twenty inches (French measure) in length. The colour of this fish is brownish-violet, with blue and red reflections. The authors just mentioned do not appear quite satisfied as to the true affinities of this genus.

14. *Ambassis* (Cuv. and Val.). This genus is founded upon a small fish found off the coast of the Isle of Bourbon; its principal characters consist in the double series of denticulations on the lower portion of the preoperculum, a denticulated infra-orbital, a protractile mouth, and a small recumbent spine in front of the first dorsal fin, the point of which is directed forwards. In the form of the body it approaches the common perch. It is the *Ambassis Commersonii* (Cuv. and Val.): a second species is found off the Malabar coast, and there are several in the Indian seas, most of which are described by Hamilton, in his 'Account of the Fishes found in the River Ganges and its Branches,' under the generic name *Chanda*.

15. *Aspro* (Cuv. and Val.). The species of this genus have the body elongated, slender, and approaching the cylindrical form; the eye is moderate, and placed in the upper part of the head; the muzzle is obtuse, and the mouth is rather small; the first and second dorsals are widely separated, and the ventral fins are large. Two species are known; one found in the Rhone, the Saône, and some other rivers of France, is about six or seven inches in length, of a reddish or yellowish brown colour, and has four black bands extending across the back. It is the *A. vulgaris* of Cuv. and Val., and *Perca aspera* of Linnæus. The second species of Aspro (the *A. Zingel*, C. and V.), found in the Danube and its tributaries, attains a much larger size.

16. *Grammistes* (Cuv. and Val.). The species composing this genus have small scales; their operculum and preoperculum are armed with spines, but not denticulated; the anal fin has no distinct spinous rays; the body is usually moderately deep, somewhat compressed, and suddenly less deep towards the tail; the head is moderately large, the eyes moderate, and the first and second dorsal fins are placed near each other.

The *Grammistes orientalis* (Cuv. and Val.) is of small size; its colour is deep brown, and the head and body are adorned with numerous longitudinal white lines; the number of these lines, it would appear, varies in different individuals. Inhabits the Indian seas. This genus terminates the first division of the *Percoides* of Cuvier and Valenciennes, a section sufficiently extensive both as to genera and species, and (if we except a few species) in all probability a natural one.

The second division comprises those species in which the first or spinous dorsal is united with the second or soft-rayed dorsal, so as to form one continuous fin, and is composed chiefly of the great genus *Serranus*. [Serranus.]

The third division embraces those Percoid fishes which differ from the preceding in having less than seven branchiostegous rays. The principal genera contained in this division are noticed under the proper heads; like the *Serrani*, they have the first and second dorsal fins united, but there is often a deep emargination between the spinous and soft-rayed portion. The fourth division is composed of such species as have more than five soft rays to the ventral fins, and more than seven branchiostegous rays. It contains the following genera:—

1. *Myripristis* (Cuv. and Val.), or fishes having the above characters, combined with a short deep and somewhat compressed form of body, which is suddenly contracted near the tail, and furnished with large and strongly serrated scales, the head large, the mouth also large, and the eye moderate; the preoperculum is denticulated, and the operculum is serrated, and produced into a strong and large spine; there is a strong spinous ray in front of the ventral fins, and three or four spines in front of the anal, one of which at least is large: the first and second dorsals are almost separated by a deep emargination. The species of this genus inhabit the tropical seas of both the old and new world, and are usually of small size, seldom exceeding seven or eight inches in length; their colouring is usually very brilliant.

2. *Holocentrum* (Cuv. and Val.). This genus, like the last, contains fishes of very brilliant colouring, the prevailing hue being shades of red. It differs chiefly from *Myripristis* in having a strong spine on the angle of the preoperculum: the operculum is strongly serrated, and armed with large spines. The species are found in the seas of tropical climates.

3. *Beryx* (Cuv. and Val.). In this genus there is no spine on the angle of the preoperculum, and it moreover has but one rather short dorsal fin, which is not emarginated. [Beryx.]

In this division MM. Cuvier and Valenciennes also place Dr. Shaw's genus *Trachichthys*, founded on a fish from the coast of New Holland (*T. Australis*, Shaw), which apparently differs chiefly in having a double keel on the abdomen, which is strongly serrated; the preoperculum is armed with a spine.

In the fifth division of Percoïd fishes the ventral fins are placed in advance of the pectorals. It contains the genera *Trachinus*, *Percis*, *Pinguipes*, *Percophis*, and *Uranoscopus*.

In the sixth and last division the ventral fins are placed behind the pectorals. It comprises the genera *Sphyræna*, *Paralepis*, and *Polynemus*.

PERCIVAL, THOMAS, M.D., well known for his writings on medical and moral subjects, was born at Warrington in Lancashire, in the year 1740. He was brought up under the care of an elder sister, having lost both his parents at an early age, and received his education at the grammar-school of his native town. Having chosen the medical profession, he was sent to the university of Edinburgh, where he studied for three years. He afterwards visited London and Leyden, and having spent some time in both of these places, he took his doctor's degree at Leyden in 1765. In 1767 he settled in practice at Manchester, and quickly met with great success, being highly respected by all classes for his professional talents as well as for his high moral and religious worth.

Amidst his professional avocations, he found time for the pursuit of many experimental inquiries on subjects connected with medicine; and possessing considerable eloquence, he was fond of scientific discussion, and was mainly instrumental in the foundation of the Manchester Philosophical Society. This institution originated in a weekly meeting of literary men, who used to assemble at Dr. Percival's house for the purpose of conversing and reading papers on medical and scientific subjects. A number of these communications, many of them by Dr. Percival himself, were collected and published in 1781, and were so well received, that a regular organized 'Literary and Philosophical Society' was established, of which Dr. Percival was elected the first president, and which has since numbered among its members many distinguished persons, and produced many volumes of valuable Transactions.

Dr. Percival endeavoured to establish public lectures on mathematics, commerce, and the fine arts in Manchester, but was not able to succeed. He devoted a considerable portion of his time during the later period of his life to the study of moral philosophy, and he published several popular works on this subject. In his religious tenets he was a strict dissenter from the church of England, but was very temperate and unobtrusive in his opinions. He died, universally respected by the inhabitants of Manchester, on the 30th August, 1804.

Dr. Percival published many works. Most of his earlier writings (which were chiefly on medical and philosophical subjects, such as the therapeutical actions of medicines, on which he made many experiments) appeared in the form of memoirs in the 'Philosophical Transactions' of London or Manchester, and were afterwards collected and published in one volume, which came out in 1767, London, 8vo., with the title of 'Essays, Medical and Experimental.' To this two other volumes were afterwards added, one in 1773, and the other in 1778. These essays went through several editions, and acquired the author considerable reputation. One of them is devoted to the consideration of the properties of the different preparations of cinchona. Dr. Percival arrived at the conclusion that an aqueous solution of the bark possessed the greatest efficacy; subsequent experience however has not supported this opinion. Another of these essays contains an excellent and complete account of the medical properties of columba root; but the most interesting of them, which was first published in the third volume of the 'Manchester Philosophical Transactions,' consists of a detail of a number of researches on the mode of action of medicines on the blood and other animal fluids. Besides the 'Essays,' we may mention some 'Observations and Experiments on Water,' Lond., 1768, 8vo.; 'Observations on the Poison of Lead,' 1774, 8vo.; 'Moral and Literary Dissertations,' Warrington, 1784, 8vo.; 'A Father's Instructions, consisting of Moral Tales, Fables, and Reflections, designed to promote the Love of Virtue,' London, 1788, 8vo.; 'Medical Ethics, or a Code of Institutes and Precepts adapted to the Professional Conduct of Physicians and Surgeons,' Manchester, 1803, 8vo. This work was republished with additions in 1827. Besides what we have mentioned, Dr. Percival wrote many other papers on different subjects. All his works were collected and published together after his death by his son, in 4 vols. 8vo., London, 1807. To this edition is prefixed a memoir of his life and writings, and a selection from his literary correspondence.

PERCNO'PTERUS. [Vulturidæ.]

PERCUSSION, CENTRE OF, the point of a system which moves about a fixed axis, at which a force may act in such a manner as to produce no pressure on the axis. Its distance from the axis is the same as that of the centre of oscillation. [Oscillation.]

PERCUSSION, in medicine, is the method of eliciting sounds by striking the surface of the body, for the purpose of determining the condition of the organs subjacent to the parts struck.

This means of diagnosis was first employed by Avenbrugger in the middle of the last century; it was afterwards extensively adopted by Corvisart in investigating the diseases of the heart, but its value, like that of all the other branches of auscultation, was not fully appreciated till Laennec made them the subject of his peculiar study. Since his time its value has been considerably enhanced by the labours of M. Piorry.

Everybody knows that when a hollow body is struck, there is a vibration produced in the air within it, which being communicated through the walls to the external air, produces a ringing sound, whose tone varies with the size of the hollow body, the material of which it is composed, and many other circumstances; but that if the same body be filled with a fluid or a nearly solid substance, no other sound is produced than that which results from the striking together of two solid bodies of the same materials, as the wall of the cavity and the substance with which it is struck. On these circumstances the practice of percussion is based. If any part of the body beneath which there is a hollow organ, or one containing air in tubes, be struck, a resonance is produced; if any part which lies over a solid or a fluid be similarly struck, the sound emitted is merely the dull noise of two solid and rather soft bodies.

The modes of employing percussion are various. The simplest and most convenient is to place one finger of the left hand flat upon the part to be examined, and to strike it lightly but rather sharply with the ends of the three first fingers of the right hand set close together on the same level. Instruments called pleximeters have been invented by M. Piorry and others, and are sometimes, though now rarely, used; they are composed of small plates of cork, india-rubber, light wood, or ivory, which being held either by their edges or by a handle, are placed on the part to be examined, and struck with the fingers, or with a small hammer. There is however no important advantage to be derived from them, and the use of the fingers alone is much more convenient. It is indeed sufficient to strike the unguarded surface with the ends of the fingers; but this method has no advantage to compensate for the pain which it sometimes produces, and which is effectually prevented by the intervention of the finger of the left hand. Care should be taken that the blows are always given with the same or an exactly estimated degree of force, and that they should fall perpendicularly to the surface of the organ to be examined.

Percussion is chiefly employed in the diagnosis of diseases of the lungs, heart, and abdominal organs. The particular symptoms which are obtained by it in each disease are detailed, with their other signs, in the articles devoted to each. [PHTHISIS; HEART, DISEASES OF, &c.] It will be sufficient here to state the general rules to be observed.

The lungs being chiefly composed of tubes and cells filled with air, there is a certain degree of resonance when the chest over any part of them is struck; but the character of the sound varies somewhat both in intensity and in tone according to the part of the chest examined, and the thickness and softness or hardness of its walls: in all parts however, when the lungs are healthy, there is resonance. When however the lung is covered by fluid, or has the quantity of air in it lessened by obstruction of the air-tubes, or by deposits of fluid or solid substances in or around the cells, the resonance of the chest directly over the part affected is diminished or entirely lost, and in extreme cases the only sound obtained by percussion is the dull sound of the contact of the fingers with the wall of the chest. When, on the other hand, the air-cells are dilated, and the lungs contain a greater proportion of air than is natural to them, as in emphysema of the lungs, the resonance of the chest is in a corresponding degree increased. The various degrees between perfect dullness, such as occurs when the lung is covered by fluid [HYDROTHORAX], or rendered solid by inflammation [LUNGS, DISEASES OF], or by tubercular deposition [PHTHISIS], and the highest degree of resonance in emphysema, are numerous, but are of course appreciable only by a very practised ear and hand. To them the evidence they afford is scarcely less valuable than that obtained from the use of the stethoscope, with which the practice of percussion should, in all diseases of the chest, go hand in hand.

In the healthy state, the chest, when struck over the region of the heart, emits a duller sound than that which proceeds from the rest of its walls. In the natural size of the heart this region occupies a space of an inch and a half or two inches square, situated just to the left of the sternum, at the level of the fourth and sixth ribs. When either the heart itself is enlarged, or a quantity of fluid is accumulated in the pericardium, the extent of this less resonant region is increased in a corresponding degree; but the changes of sound which it emits depend greatly on the coincident condition of the lungs, and the extent to which their anterior margins overlap the front of the heart.

By percussion on the abdomen one may obtain information, approximating to truth, of the size of all the solid organs, by the extent of the dullness of sound in their respective regions; and of the degrees of inflation, and even of the nature of the contents of the digestive canal and the peritoneal cavity, whether solid, liquid, or aeriform; but the evidence thus obtained is on the whole less definite in the diseases of the abdominal organs than in those of the heart and lungs. The best account of diagnosis by percussion is in the works of M. Piorry.

(*De la Percussion mediate*, Paris, 1828; and *Du Procedc operatoire*, &c., 1830.)

PERCY, THE FAMILY OF, one of the most illustrious in England.

Percy was in use as a name of addition in England as early as the reign of the Conqueror. This fact we learn from a most indisputable authority, Domesday Book, where we find William de Percy holding numerous manors in the counties of Lincoln and York. It is presumed that he was one of the persons who accompanied the duke of Normandy, and as there are three places called Percy in Lower Normandy, it is a very reasonable supposition that the name was derived from residence at one of those places.

From this William descended several persons of the name who occur in the chronicles and as benefactors to the church, till the reign of Henry II., when another William de Percy died without male issue, leaving two granddaughters (children of a son who died before him) his heirs. These great heiresses made splendid marriages; Maud marrying the earl of Warwick, and Agnes, Josceline of Louvain, a brother of Adeliza, the second wife of king Henry I. By the death of Maud, without issue, the descendants of Agnes became the sole representatives of the first race of Percys, and they adopted the name of Percy as their name of addition.

This Josceline, who was the male ancestor of the Percys of whom we read so much in the English history, was of the family of the dukes of Brabant, one of the most illustrious in Europe. One of his sons was active among the barons at the time when King John granted the great charter, and his descendants, for two centuries after his time were conspicuous on all occasions when the barons acted as a body. It was a Henry de Percy who, in the reign of Edward I., acquired Alnwick and other lands in Northumberland, which thenceforward became the county to whom the Percys are particularly supposed to belong. Warkworth was granted to his son.

It is impossible to do more than touch on a few of the more prominent circumstances. Another Henry de Percy, in the reign of Edward III., married Mary of Lancaster, daughter of Henry (Plantagenet) earl of Lancaster, grandson of King Henry III. This marriage brought the succeeding Percys into near alliance with the crown, and the two sons who issued from it were made the one earl of Northumberland, the other earl of Worcester. Both these titles were conferred by King Richard II.

The title of earl of Worcester soon ceased in this family, the earl having engaged in the rebellion against King Henry IV., and being beheaded at Shrewsbury soon after the battle which was fought near that town. In the same battle Henry Percy (Hotspur), nephew of the earl of Worcester, son to the elder brother, the earl of Northumberland, was slain; and the earl of Northumberland himself, uneasy under the rule of his near relative Henry IV., was slain by the posse comitatus of Yorkshire in 1408.

The son of Hotspur was restored by Henry V. to the title of earl of Northumberland. He was slain at the battle of St. Alban's in 1455, and his son, the third earl, fell at the battle of Towton, 1460. The fourth earl was slain in a tumult at Thirsk, in 1489. The fifth earl died in peace, in 1527. He is the earl whose 'Household Book' is published, a volume which exhibits very much of the customs of the time in the houses of the great. The sixth earl, his son, died also in peace, in 1537.

As the sixth earl died without issue, there was fear lest the honours of this great family should be lost, for the next heir male descended from an attainted member of the family, and so could not succeed. It seems to have been intended that the title of Northumberland should pass from them, for John Dudley, earl of Warwick, was made, by King Edward VI., duke of Northumberland. His honour was however short-lived, and he being dead and attainted, Queen Mary restored the male heir of Percy to the earldom of Northumberland. But the same evil fate pursued him. He engaged in rebellion against Queen Elizabeth, and was put to death at York, in 1572. His brother Henry Percy succeeded, in virtue of limitation in the patent of restoration granted by Queen Mary. This earl came to a violent end, being imprisoned in the Tower, and found dead in his bed, shot with three pistol-bullets. This was in 1585. After him were several other earls of Northumberland of this family, the last of whom was earl Josceline, the eleventh earl, who died at Turin, in 1670, being then aged twenty-six. In this earl the principal male line of Percy became extinct. There were living at the time persons who believed themselves to be of the blood, and some of them indisputably were so, but only one of them, a trunk-maker, at Dublin, whose descent is very dubious, prosecuted any claim to the honours of the family, and his claim was disallowed.

Josceline, earl of Northumberland, left an only daughter and heir, lady Elizabeth Percy. This great lady married first, Henry Cavendish, earl of Ogle, who thereupon took the name of Percy. He died very soon after the marriage. She was then contracted to Thomas Thynne, Esq., who was assassinated just at the time in Pall-Mall. She then married, in 1682, Charles Seymour, duke of Somerset, who undertook to relinquish his hereditary name, and to call himself and his posterity by the name of Percy. Such was the determination to keep up the splendid name. Some time after however the duke was released from the obligation, and resumed his name of Seymour.

The duke of Somerset had Algernon, his son and heir, duke of Somerset, who was created, in 1749, earl of Northumberland, with remainder to his son-in-law Sir Hugh Smithson, who had married lady Elizabeth Seymour, his only daughter and heir.

Sir Hugh Smithson became earl of Northumberland on the death of his father-in-law, when he took the name of Percy. In 1766 he was created duke of Northumberland. From him descend the three existing peers of the family of Percy, namely, the duke of Northumberland, the earl of Beverley, and lord Prudhoe.

A large history of the family may be read in Collins's 'Peerage,' especially in the edition of 1779; but there are valuable parts of the history in earlier editions, which are there left out.

PERCY, THOMAS, D.D. (born 1728, died 1811), an elegant scholar, and a prelate of the Irish church, was the son of a grocer at Bridgnorth in Shropshire, where he was born. He affected to be considered of the noble house of which we have been speaking, or it has been affected for him; but his better and surer honour is that he was the maker of his own fortunes, and by his valuable writings and the honourable discharge of his episcopal duties has reared for himself a high and permanent reputation. He was educated at Christ-Church, Oxford, and early in life obtained the vicarage of Easton Mauduit, on which he resided, and the rectory of Wilby.

He began his literary career by the publication of what purports to be a translation from the Chinese of a novel, together with other matters connected with the poetry and literature of that people. This is a translation by him from a Portuguese manuscript. This was soon followed by another work, entitled 'Miscellaneous Pieces relating to the Chinese.' He next published translations from the Icelandic of five pieces of Runic poetry. These appeared in 1761, 1762, and 1763. In 1764 he published a new version of 'Solomon's Song,' with a commentary and notes; and in 1765, a 'Key to the New Testament,' which has been reprinted several times. In the same year, 1765, appeared the work by which he is best known, and which is indeed one of the most elegant and pleasing works in the whole range of English literature, to which he gave the title of 'Reliques of Ancient English Poetry.' It contains some of the best of the old English ballads; many very beautiful lyrical pieces by the poets of the Elizabethan period and the age immediately succeeding; a few extracts from the larger writings of the poets of those periods, and a few lyrical pieces by modern writers. Each piece is well illustrated. There have been several editions of it, the last of which is in a cheap form, in one octavo volume.

The publication of so popular and pleasing a work naturally drew attention to the author or editor, and particularly the duke and duchess of Northumberland took notice of one who bore their name, and in or about 1765 he was appointed domestic chaplain in the family. In 1769 he was made one of the chaplains of the king; in 1778, dean of Carlisle; and in 1782, bishop of Dromore.

During the period of which we have been speaking he continued his literary labours. In 1770 he printed the 'Northumberland Household Book,' and a poem, the subject of which is connected with the history of the Percy family, called 'The Hermit of Warkworth.' In the same year appeared his translation, with notes, of 'The Northern Antiquities,' by Mons. Mallet. The assistance which he gave to other authors is often acknowledged by them, and especially by Mr. Nichols, in several of his works.

When he became an Irish bishop, he thought it his duty to devote himself almost entirely to his diocese. He resided from that time almost constantly at the palace of Dromore, where he lived greatly respected and beloved. After a life in the main prosperous and happy, he tasted of some of the afflictions of mortality. In 1783 he lost an only son. His eyesight failed him, and he became at length totally blind. He died at the palace of Dromore, September 30, 1811.

PERDICCAS, the son of Orontes, was one of the generals of Alexander the Great, to whom that conqueror on his deathbed delivered his royal signet, thus apparently intending to designate him as protector or regent of his vast empire. Alexander's wife Roxana was then far advanced in pregnancy, and his other wife, Statira, the daughter of Darius, was supposed to be in the same situation. In the mean time the Macedonian generals agreed to recognise as king Arrhidæus, a natural son of Philip, a youth of weak intellects, with the understanding that if the child of Roxana should prove a son, he should be associated in the throne with Arrhidæus. Perdiccas contented himself with the command of the household troops which guarded the person of King Arrhidæus, but in that capacity he was in reality the guardian of the weak king and the minister of the whole empire. He distributed among the chief generals the government of the various provinces, or rather kingdoms, subject to Alexander's sway: Antipater had Macedonia and Greece; Lysimachus, Thrace; Eumenes, Paphlagonia and Cappadocia; Antigonus, the rest of Asia Minor; and Ptolemy had Egypt. For the distribution of the other provinces see Justinus (xiii. 4). Roxana, being soon after delivered of a son, who was called Alexander, became jealous of Statira, from fear that the child she was pregnant with might prove a rival of her own son; and in order to remove her apprehensions, Perdiccas did not scruple to put Statira to death. He endeavoured to strengthen himself by an alliance with Antipater, whose daughter he asked in marriage, while at the same time he was aspiring to the hand of Cleopatra, Alexander's sister. Olympias, Alexander's mother, who hated Antipater, favoured this last alliance. Antipater, having discovered this intrigue, refused to give his daughter to Perdiccas, who in the end obtained neither. The other generals, who had become satraps of extensive countries, considered themselves independent, and refused to submit to Perdiccas and his puppet kings. Perdiccas above all fearing Antigonus as the one most likely to thwart his views, sought to destroy him, but Antigonus escaped to Antipater in Macedonia, and represented to him the necessity of uniting against the ambitious views of Perdiccas. Antipater, having just brought to a successful termination a war against the Athenians, prepared to march into Asia, and Ptolemy joined the confederacy against Perdiccas. The latter, who was then in Cappadocia with Arrhidæus and Alexander the infant son of Roxana, held a council, in which Antipater, Antigonus, and Ptolemy being declared rebel against the royal authority, the plan of the campaign again them was arranged. Eumenes, who remained faithful Perdiccas, was appointed to make head against Antipat and Antigonus, while Perdiccas, having with him the tw kings, marched to attack Ptolemy in Egypt. He was however unsuccessful, owing to his ill-concerted measures: he lost a number of men in crossing a branch of the Nile, and the rest became discontented, and in the end Perdiccas was murdered in his tent, B.C. 321, after holding his power for two years from the death of Alexander. Eumenes, who had been more successful against Antipater in Asia Minor, carried on the war for some years, but was at last betrayed by his own soldiers into the hands of Antigonus, who put him to death. [EUMENES; ANTIGONUS.]

The administration of Perdiccas after the death of Alexander is treated at some length by Droysen, 'Geschichte der Nachfolger Alexanders.'

PERDICCAS. [MACEDONIA.]

PERDICIDÆ, the name of a family, or, according to some, a subfamily of *Tetraonidæ*; in the latter case the form should be *Perdicinæ*.

The genus *Perdix*, Briss., in Mr. Swainson's arrangement, is made to contain the subgenera *Perdix* (Partridges); *Chætopus* (Francolins); *Coturnix* (Quails); *Ptilopachus*, Sw.; and *Ortyx*, Stephens.

The Prince of Musignano (*Geographical and Comparative List*) makes *Perdicinæ* the first subfamily of the *Tetraonidæ*, containing the genera *Lophortyx*, Bonap.; *Ortyx*, Stephens; *Francolinus*, Briss.; *Perdix*, Bonap.; *Starna*, Bonap.; and *Coturnix*, Temm. It must be borne in mind that this list relates only to the birds of Europe and North America.

The *Perdicinæ*, according to Mr. G. R. Gray's arrangement, form also the first subfamily of the *Tetraonidæ*, and consist of the following genera:—*Ithaginis*, Wagler; *Francolinus*, Briss.; *Perdix*, Lath.; *Starna*, Bonap.; *Lerwa*, Hodgs.; *Arboricola*, Hodgs.; *Coturnix*, Briss.; *Ptilopachus*, Swains.; *Liponyx*, Vieill. [ROULOUL]; *Ortyx*, Stephens; *Lophortyx*, Bonap.; *Callipepla*, Wagler; *Odonto-*

phorus, Vieill.; and *Tetraogallus* (Lophophorus of Jardine and Selby), J. E. Gray.

Geographical Distribution.—The birds of this group are widely spread; no quarter of the globe being without some of the family, all of which are more or less esteemed as affording a nutritious and sapid food to man.

We now proceed to lay before the reader some of the leading forms among this extensive race; as far as our limits will permit.

Perdix (Ray—*Starna*, Bonap.).

Example, *Perdix cinerea; Starna cinerea*, Bonap. This, the well known object of every European partridge-shooter, is too familiar to require description.

It is the *Perdice*, *Pernisette*, *Pernigona*, and *Starna* of the Italians; *Perdris*, *Perdris gringette*, *Perdris griesche*, *Perdris grise*, *Perdris Gouache*, and *Perdris des Champs* of the French; *Rebhuhn* of the Germans; *Coriar* of the antient British;* *Partridge* of the modern British.

Localities.—Mr. Gould (and he is corroborated by other authors) considers this species as strictly European; though M. Temminck speaks of it as a visitor to Egypt and the Barbary coast.

Habits, &c.—The ardent temperament of the Partridge has been the theme of many writers on natural history from Pliny downwards; and the parental affection of the female for her young seems to be not less strong than the sexual ardour of the male. The rough nest, which is placed on the ground in corn-fields, meadows, &c., contains from twelve to eighteen or even twenty eggs of a greenish ash-colour; and the hen sits so close, that her head not unfrequently falls before the scythe of the mower, as represented in one of Bewick's admirable cuts. To relate all the anecdotes of the maternal affection of this bird would be endless—and indeed the male watches over the young with paternal care: one or two must suffice. Pennant records a strong instance:—A partridge followed by a large covey of very young birds was surprised by a violent shower of rain. 'She collected them under her,' says Pennant, 'and to secure them further, spread her wings to prevent every injury. In vain! The storm encreased, yet she would not quit her charge; she preferred death, and we found her lifeless (with all the little brood) with distended wings, retaining her attempt to preserve them even to the very article of death.' Mr. Selby relates that a person engaged in a field not far from his residence had his attention arrested by some objects on the ground, which, upon approaching, he found to be a male and female partridge, engaged in battle with a carrion crow; so absorbed were they in the issue of the contest, that they actually held the crow, till it was seized and taken from them by the spectator of the scene. Upon search, the very lately hatched young were found concealed among the grass, and the crow had been doubtless attacked by the parents during his attempt to carry off some of their offspring. The wiles and stratagems put in practice by the hen to draw the intruder from the place where her affrighted young have taken refuge are wonderful: she will limp about as if lame of a leg or wing, and so induce one unaccustomed to her deceptions to follow her from the brood, to which she flies back by a circuitous route. White saw a hen partridge come out of a ditch, and run along shivering with her wings, and crying out as if wounded and unable to get from him. While the dam acted this distress, the boy who attended White saw her brood, which was small and unable to fly, run to an old fox-earth for shelter. Markwick, too, observes that it is not uncommon to see an old partridge feign itself wounded and run along on the ground fluttering and crying before either dog or man, to draw them away from its helpless unfledged young ones. 'I have seen it often,' says Markwick, 'and once in particular I saw a remarkable instance of the old bird's solicitude to save its brood. As I was hunting a young pointer, the dog ran in on a brood of very small partridges; the old bird cried, fluttered, and ran tumbling along just before the dog's nose, till she had drawn him to a considerable distance, when she took wing and flew still farther off, but not out of the field: on this the dog returned to me, near which place the young ones lay concealed in the grass, which the old bird no sooner perceived than she flew back again to us, settled just before the dog's nose again, and by rolling and tumbling about, drew off his attention from her young, and thus preserved her brood a second time. I have also seen, when a kite has been hovering over a covey of young partridges, the old birds fly up at the bird of prey, screaming and fighting with all their might to preserve their brood.'

Aristotle describes his *Perdix* (see post) as tumbling about to draw intruders from her nest, and fixing their attention till the young have time to escape. (*Hist. Anim.*, ix. 8.)

The pairing time is generally about the beginning of February, but notwithstanding the ardour of these birds, the attachment soon seems to be directed to another object, if any accident happen to that first selected; at least as far as the female is concerned. White mentions a sportsman whose zeal for the increase of his game being greater than his humanity, he, after pairing time, always shot the cock bird of every couple of partridges upon his grounds, supposing that the rivalry of many males interrupted the breed: he used to say, that though he had widowed the same hen several times, yet he found she was still provided with a fresh paramour that did not take her away from her haunt.' The same delightful author states that he knew a lover of setting, an old sportsman, who had often told him that soon after harvest he had frequently taken small coveys of partridges, consisting of cock birds alone, which he pleasantly used to call old bachelors. It thus appears that the number of males much exceeds that of the females: the rivalry between the amorous combatants in the spring—and their battles are long and bloody—would seem to be the usual provision to secure the strongest males for the continuation of the species. They roost on the ground together, generally in large fields, far from hedges or coverts, probably, as White observes, to secure themselves from pole-cats and stoats. There are accidental pied or whitish varieties.

Common Partridge.

The above form has been separated from the other partridges, *Perdix Græca*, Briss., *Perdix rubra*, *Perdix petrosa*, &c., by the Prince of Musignano. The first of these (*Perdix saxatilis* of Meyer, *La Bartavelle*) is most probably the πέρδιξ (Perdix) of Aristotle. All these, which are European, as well as *Perdix Chukar* from the Himalaya mountains, have a rudimentary blunt spur on the tarsus, which, with their general plumage and red legs and bill, seem to justify the Prince's separation.

The *Greek Partridge* inhabits the Alps, the Tyrol, Switzerland, Italy, Turkey, and the Archipelago. *Perdix petrosa* (the *Barbary Partridge*) is common on that part of the African coast and in the southern portions of Europe, especially those which are washed by the Mediterranean Sea. In the mountainous parts of Spain, and in the islands of Majorca and Minorca, Sardinia, Corsica, Malta, and Sicily, it is abundant; but it is rare in France, and not known in the north of Europe. *Perdix rubra*, the common *Red-legged* or *Guernsey Partridge*, is abundant in France and Italy, rare in Switzerland, and still rarer in Germany and Holland. Mr. Gould observes that it is confined to the European continent and the islands of Guernsey and Jersey, but M. Temminck (*Manuel*, part iv.) states that it is found in Japan, where it was observed by Dr. Von Siebold and M. Bürger, identical in form and colour of plumage. It has been introduced into our preserves, and is now rather plentiful in some parts, especially in Suffolk. But we doubt whether those who have introduced it have much reason to be pleased with the importation. They persecute almost to extermination the Common Partridge (*Starna cinerea*), a much better bird, whether regard be had to the sports of the field or the pleasures of the table. They are most determined runners, and few birds are more calculated to injure the behaviour of a well-bred and well-broken pointer or setter than the Red-legged Partridge; if anything can make him puzzle, that partridge will. Though the flesh is not so juicy as that of the Common Partridge, a well fed plump young red-legged partridge, split down the back and broiled upon a good clear fire, is not bad eating. It is probably the *Perdix* of the antient Italians. Martial (xiii. 76), in allusion to the insane epicurism of the Romans, which seems to have valued price more than flavour, says

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* The word *Pertrisen* or *Petrisen*, in use by the Welsh, is supposed to be borrowed from the Normans.

'Carior est Perdix; sic sapit illa magis.'

Francolinus. (Briss.)

Generic Character.—*Bill* small, moderate in size, convex above, and slightly curved downwards at the tip. *Nostrils* basal, lateral, partially closed by a naked over-arching membrane. *Tail* of twelve feathers, moderate, slightly rounded. *Feet* naked, four-toed, tarsi of the male armed with strong blunt spurs.

This is the genus *Pternistes* of Wagler, and *Chætopus* of Swainson.

The rudimentary spurs of the *Red-legged Partridges* become in the *Francolins* well developed.

Geographical Distribution of the Genus.—The old continent and its islands. The form occurs in Europe, Asia, and Africa. The Francolins are forest birds, perch on trees, and feed on seeds, bulbs, &c.

EUROPEAN FRANCOLIN.

The *European Francolin, Le Francolin à collier roux* of the French, *Francolino* of the Italians, *Francolinus vulgaris*, is a fine and handsome bird; and the plumage of the adult male is rich.

Mr. Gould, who has given beautiful figures of the male and female, of the natural size, in his 'Birds of Europe,' says, 'In the bird before us we trace, or fancy we can trace, one of those unions through which the splendid-coloured Pheasants of the East are united to the sober-coloured Quails and Partridges of the European continent, its form and habits connecting it with the latter, while its colouring manifests a relationship to the beautiful Oriental genus *Tragopan*. The near relationship which we fancy exists between the genera *Francolinus* and *Tragopan* consists in their general style of colouring, in their short spurs, and in the conformation of the beak. Another section of the genus *Francolinus*, peculiar to Africa, exhibits also a form differing from these in the structure of the beak, in which particular, as well as in the uses to which it is applied in obtaining food, it assimilates to the Oriental genus *Lophophorus*; still between these groups we may yet expect to find others, harmonising with each so as to form a complete amalgamation.'

We select Mr. Gould's description as being very accurate. In the male, the feathers on the top of the head are black, with a margin of yellowish brown; ear-coverts white; circle round the eyes, lower part of the cheeks, sides of the head and throat of a deep black, below which a broad chestnut collar extends round the neck; wings and back yellowish brown, each feather having a dark reddish brown centre, except those of the quills, which are barred with this colour; rump and tail-coverts white, barred with black, as are also the middle tail-feathers, the outer ones being entirely black; breast and lower parts black; sides blotched with black and white; thighs brownish, barred with black; under tail-coverts chestnut; beak black; legs reddish flesh-colour; tarsi spurred.

In the female the general ground-colour of the plumage is yellowish brown, darker on the cheeks and quill-feathers, and becoming paler on the under parts; the feathers of the back and wings are marked as in the male; the breast and under surface irregularly crossed with bark-shaped marks of dark brown; the rump and tail-coverts barred alternately with broad marks of obscure brown and narrow lines of white; under tail-coverts chestnut; beak brownish; legs reddish; tarsi unarmed. (*Birds of Europe.*)

Habits, Food, &c.—This Francolin haunts humid places, perches on trees, and feeds, like the Common Partridges (which, as Mr. Gould observes, it resembles in the form of the bill), on insects, seeds, &c., but not on bulbs, like others of the genus. M. Temminck, in the lately published part of his 'Manuel' (the fourth), mentions myrtle-berries and the tender tops of herbs among its food. Nothing particular seems to be known about its nest, &c.

Localities.—This species is widely distributed. M. Temminck, in the second part of his 'Manuel' (1820) states that it inhabits the most southern parts of Europe, Sicily, Malta, Sardinia, the kingdom of Naples, the islands of the Archipelago, and Turkey. The species is the same, he adds, throughout Asia and in the north of Africa, its haunts being marshes and prairies.

Mr. Gould says that in Europe its habitat appears to be exclusively confined to the southern regions, as Sicily, Malta, and the Neapolitan territories, but it is also found, he adds, in the north of Africa, and over the greater portion of the Asiatic continent. He had received it in collections from the Himalaya Mountains. M. Temminck, in the fourth part of his 'Manuel' (1840), remarks that it is not found in Sardinia nor in the kingdom of Naples, that it is still abundant in the humid spots between Caltagirone and Terranova, but almost entirely annihilated elsewhere. Individuals from Bengal and Persia differ in nothing, he adds, from those of Europe.

Utility to Man.—The flesh of this species is highly esteemed, particularly in India.

ASIATIC FRANCOLINS.

The *Francolinus Ponticerianus, Perdix Ponticeriana* of Latham, *Ferruginous and Grey Francolin*, appears to be confined to Asia.

This species, according to Colonel Sykes, is the *Teetur* of the Mahrattas, and is called a partridge in the Dukhun (Deccan), where it is the most common of birds, frequenting gardens and cultivated lands. The Colonel describes the irides as intense red brown, and its length, inclusive of the tail (which is three inches and six-tenths) as fourteen inches. He states that it is not met with in the Ghauts, unless in well cultivated valleys, and not at all on the mountains. It roosts on trees, in which situation the Colonel on more than one occasion, shot them during the day time; but this was a rare occurrence. (*Zool. Proc.*, 1832.)

Francolinus Ponticerianus.

Another Francolin, *Francolinus spadiceus*, measuring with the tail (which is five inches) fourteen inches and seven-tenths, is very common in the thick brushwood of the Ghauts. Colonel Sykes had both sexes alive in his possession for some time, and has no doubt that they might be successfully introduced into Europe. He describes them as excellent eating, and says that they rarely take wing or perch. The male has a harsh trisyllabic call, *Koh-kut-tee*, whence the Mahrattan name (*Kokatree*). The female in confinement uttered little notes like the twittering of a chicken. A male in Colonel Sykes's collection had three large spurs on one leg and two on the other. (*Zool. Proc.*, 1832.)

African Francolins.

Africa seems to be the locality of several species of Francolin. Dr. Smith has figured four in his useful and beautiful work* now in course of publication.

We select *Francolinus pileatus* as an example.

Description.—Upper surface of the head rusty grey, clouded with brown; back and sides of the neck, together with the interscapulars, intermediate between brownish orange and reddish brown, the feathers of the former broadly margined with white, and those of the latter marked each with a broad white stripe along the centre; in some the stripe is divided longitudinally by a narrow black line, in others it is margined on each side by a brownish stripe; back and upper tail-coverts yellowish grey; the former faintly clouded with brown, the latter delicately mottled with very fine transverse lines of the same colour; shoulders hair brown, several of the feathers broadly edged with reddish brown, and all marked with a white stripe in the course of the shafts; primary quill-coverts and primary and secondary quill-feathers chocolate brown, with yellowish white shafts; the outer vanes of the primaries towards their bases margined with pale sienna yellow, or light reddish brown, and those of the secondaries, throughout their whole length, with white; over each eye a white stripe, which terminates at the nape of the neck, and beneath the eye another, which ends before the ear-coverts; these stripes in front of the eye are separated from each other by a dark-brown blotch; chin, throat, and cheeks white, the two latter delicately spotted with pale reddish orange; the breast and belly cream-yellow, the former marked with large fan-shaped, dark reddish-brown spots, and the latter closely barred with delicate undulated brown lines; vent and under tail-coverts pale ochry yellow, sparingly barred with zig-zag brown lines; two central tail-feathers light reddish brown, closely mottled with delicate waved brown bars; the remaining feathers dark umber-brown, except the outer vanes towards the quills, which are reddish brown, freckled with indistinct lines of a darker shade; bill dark horn-coloured; eyes reddish brown; tarsi and toes pale Dutch orange; claws and spurs pale horn-colour. Length, from point of bill to tip of tail, thirteen inches six lines. (Smith.)

The *female* nearly resembles the *male* whose plumage is above described, but her tarsi are unarmed.

Francolinus pileatus. (Smith.)

Locality, Habits, Food, &c.—The expedition under the direction of Dr. Smith saw the first specimens of this handsome Francolin on the banks of the Marikwa river, which flows in a north-easterly direction from Kurichane. 'It showed,' says Dr. Smith, 'but little disposition to resort to the jungle, though when disturbed in more open localities, which it by choice frequents while feeding, it, like *Francolinus Natalensis*, seeks concealment in the bosom of the thickets. Early in the morning specimens were observed in moderate abundance upon the open grassy plots which occurred intersecting the wooded regions that skirted both sides of the stream, and there they appeared to find their food in plenty, which was found to consist of small bulbous roots, seeds, insects, &c. To the same localities these birds were also observed to resort towards evening; but at that period they were less readily discovered, owing to their being commonly more silent at that time. During the middle of the day they were rarely observed, and from what was ascertained there were grounds for believing they repose while the sun is warm, and that while enjoying rest they are generally perched upon dwarf trees or shrubs, no doubt to be the more secure from the teeth of the numerous predatory quadrupeds which are constantly traversing the woods in quest of prey.'

Francolinus Swainsonii of the same author, with its naked throat, wrinkled space round the eye, and more sombre plumage, seems to be a step towards some other rasorial forms, and to differ so much from its congeners as almost, if not quite, to justify separation.

Coturnix. (Briss.)

We now return to the Partridge-like (Starna) plumage and bearing and the spurless legs of the smaller *Perdices*, vernacularly known as *Quails*.

Generic Character.—Bill naked at the base, slender, convex above, curved towards the end; no red eye-brows. *Tarsus* spurless. *Tail* short. *Wings* rounded. First quill of equal length with the rest.

Geographical Distribution of the genus.—The Old World and Australia only.

European Quail.

Example, *Coturnix dactylisonans*, Mayer (*Tetrao Coturnix*, Linn.; *Perdix Coturnix*, Latham.).

This well known bird, a description of which would be superfluous, seems to be the Ortyx (ὄρτυξ) of Aristotle, who mentions the bird repeatedly in such terms as to its habits and migration as to leave little or no doubt on the point; and the *Coturnix* of the antient Italians. It is the *Quaglia* of the modern Italians; *Caille* of the French; *Wachtel* of the Germans; *Sofliar* and *Rhinc* of the antient Britons; and *Quail* of the modern British; *Lohah* and *Lowa* of the Mahrattas.

Geographical Distribution.—The Quail is very widely distributed. 'No individual of the Gallinaceous order,' says Mr. Gould, 'enjoys so wide a range in the Old World as the *Common Quail;* it is abundant in North Africa, most parts of India, and, if we mistake not, China; while the whole of the southern portions of Siberia, and every country in Europe except those approximating to the polar circle, are visited by it annually, or adopted for a permanent abode. A considerable number are stationary in the southern portions of Europe, such as Italy, Spain, and Portugal, but their numbers are greatly increased in the spring by an accession of visitors which emigrate from the parched plains of Africa in search of more abundant supplies of food and a congenial breeding-place. So vast and countless are the flocks which often pass over to the islands and European shores of the Mediterranean, that a mode of wholesale slaughter is usually put in practice against them, a circumstance which no doubt tends to limit their inordinate increase.'

These migrations have been noticed by the earliest writers on natural history. Thus Aristotle speaks of their autumnal departure in the months Boedromion and Maimacterion (*Hist. An.*, viii. 12). Belon speaks of finding them on the shores of the Mediterranean in spring and autumn at their arrival and departure, and of their flying on board his vessel for repose. Once in his passage from Rhodes to Alexandria he ate of some that had been taken with corn unchanged in their crops. Hasselquist states that an amazing number of these birds come to Egypt in the month of March, when the wheat ripens there. 'They conceal themselves,' says he, 'in the corn, but the Egyptians know extremely well that there are thieves in their grounds; and when they imagine a field to be full of them, they spread a net over the corn and surround the field, at the same time making a noise by which the birds are frightened, and endeavouring to rise, are caught in the nets in great numbers, and make a most delicate and agreeable dish.'

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* 'Illustrations of the Zoology of South Africa.'

Dr. Von Siebold and M. Bürger mention a variety of this species as an inhabitant of Japan. M. Temminck states (*Manuel*, 4th part) that those individuals which he had received from the last-named locality differed scarcely at all from those of Europe and Africa. He observes that the species varies in size and stature.

In this country the bird is not very abundant; and the supply for the London market comes principally from France. It arrives here in spring, generally early in May, and departs in October. The males come first, betray themselves by their three repeated whistle, and are frequently lured within reach of the fowler by the imitation of the female's note on a quail-pipe; sometimes by the voice, but the performer must be a perfect mimic.

Habits, Food, Reproduction.—The ardent and pugnacious nature of these birds was taken advantage of by the ancients, and quail-fighting was a favourite amusement of the Greeks and Romans, as it still is of the Chinese. Their food consists of grain and seeds, insects, and slugs or worms. They are fattened for the table on hemp-seed principally. Pennant is too general when he says that the ancients *never* ate these birds, supposing them to have been unwholesome, as they were said to feed on hellebore. *Pliny* indeed (*Nat. Hist.*, x. xxiii.) says they were not eaten on account of their feeding on poisonous seeds; and also because they were subject to the epilepsy, or falling sickness, but this vulgar error did not, we suspect, banish so delicious a bird from the tables of the better informed. (See *Athenæus*, *Deipn.*, ix. xlvi.; ibid. xlviii.; xi. xxiv.)

The *Quail* is polygamous; and the nest of the female, if nest it may be called—for it is little more than a hole scratched in the ground, generally in some field of green wheat—contains, in this country, from six to twelve or fourteen bluish dusky-green or olive-green eggs. On the Continent, as many as eighteen or twenty have been found; but here six or eight is the usual number of a *bevy*, as the brood is called: *covey* is the term applied to a family of partridges.

Quails are noted by Hasselquist as having been seen by him in Galilee. The *Quail of the Israelites* (*Tetrao Israelitarum*, Hasselq.) was considered by him to be a new species of *Tetrao*: he found it at Jordan, and in the wilderness near the mountains of Arabia Petræa. Hasselquist describes it, in a letter to Linnæus, as much resembling the red partridge, but not larger than a turtle dove. 'I expect,' says Hasselquist, 'in a few days, to get a score of them alive, which were promised me by a person at Jerusalem, whither the Arabians carry many thousands to sell at Whitsuntide. If natural history can give any information in the interpretation of the Bible, this bird is certainly the same with the Quails of the Israelites, and they alone would deserve a journey to Jordan; for my part, I was so pleased with this discovery as to forget myself, and almost lost my life before I could get one into my possession.' In his list of birds seen by him in the Holy Land, the *Tetrao Israelitarum* is again mentioned as having been met with in the deserts near the Dead Sea. Linnæus, to whom Hasselquist's specimens as well as his observations were in all probability communicated, makes his *Tetrao Israelitarum* a synonym of his own *Tetrao Coturnix*, the *Common Quail*, and in this he is followed by Gmelin and others generally. Col. Sykes, who has devoted much attention to the Quails and *Hemipodii*, remarks that the fact of *Coturnix dactylisonans* being the only species of quail that migrates in multitudes is another reason for connecting it with the bird of Scripture, and indeed he pronounces it to be the identical species on which the Israelites fed. This is perhaps not the place to discuss such subjects, but it may be necessary to remind the reader that Rudbeck asserted that the living food which 'came up and covered the camp' (*Exod.*, xvi. 13) was the *Flying-Fish*. We dismiss this at once. Ludolph, who thought that the animal was a locust, is, at first sight, more worthy of attention; but the word שאר (*sheer*, 'flesh') (*Psalm* lxxviii. 27) could hardly have been applied to locusts. Then, according to good authorities (Bochart; Harris), the Hebrew word in *Exodus* is שלו (*selav*, Arabic *selwa* or *salwai*, a quail), and the Septuagint and Vulgate both lead to the conclusion that it was certainly a bird, and almost certainly a quail. See further Scheuchzer, *Physica Sacra* (vol. i., p. 175), where the Hebrew is translated upon both sides of the page 'coturnix,' as it is at p. 180; but the plate referred to, tab. clvi., represents the Israelites collecting locusts, and beneath the plate is printed 'Exod. xvi. 13, Selavim. Locustæ.' In the very next plate however, tab. clvii., representing many birds, we have the same chapter and verse quoted, with the following translation: 'Selavim, Coturnices, aliaque.' Fig. 2 of that plate is no bad representation of a quail. There can be little doubt that *Quails* formed the seasonable supply; and, if this be admitted, we have, as Col. Sykes observes, proof of the perpetuation of an instinct (migration) through upwards of 3300 years, the fact recorded having occurred 1491 years before Christ.

The song of Quails is noticed by Athenæus (*Deipn.*, ix. xlviii. p. 392). Bechstein, among the attractive qualities of the species, reckons, besides the beauty of its form and plumage, the *song of the bird* as no slight recommendation to the amateur. He states that in the breeding season the song of the male commences by softly repeating tones resembling '*werra, werra*,' followed by '*pickwerwick*' uttered in a bold tone, with the neck raised, the eyes shut, and the head inclined on one side. Those that repeat the last syllables ten or twelve times consecutively are the most esteemed. The song of the *female* only consists of '*werra, werra*,' '*pupu, pupu*,' the two last syllables being those by which the male and the female attract each other's attention. The angry cry generally resembles, according to Bechstein, the word '*guillah*;' but at other times it is only a purring murmur. (*Cage Birds*.)

ASIATIC QUAILS.

Col. Sykes, in his valuable paper 'On the Quails and Hemipodii of India' (*Zool. Trans.*, vol. ii.), in which he states that he found the tongue and the cæca of birds to be of considerable importance in indicating affinities or dissimilarities between genera, notices *Coturnix dactylisonans*, *textilis*, *Erythrorhyncha*, *Argoondah*, and *Pentah*. Of these we select *Coturnix Argoondah*, the *Rock Quail* of Dukhun (Deccan).

Col. Sykes remarks that there are so many trifling variations in the markings of the plumage of the upper surface of this bird, that it is difficult to fix upon the exact type. 'The male,' he says, 'is readily distinguished by the numerous transverse narrow black bars upon the breast; but the young males and the females want these bars, and vary so much in the markings on the back, that with those disposed to manufacture species from plumage alone, the eleven specimens before me from Dukhun would furnish at least four new species.' The Colonel however gives an elaborate and accurate description of the sexes (which scarcely differ in size) in a mature state, to which we refer the reader.

Coturnix Argoondah. (Sykes.)

Food, Habits, &c.—Grass-seeds only were found in the stomachs of Col. Sykes's specimens. He states that they do not frequent cultivated lands, but are found all over the Dukhun on the general level of the country, amidst rocks and low bushes, and that they rise in coveys of from ten to twenty or more, from under the feet, with startling suddenness and bustle, so that the young sportsman is perplexed in selecting his bird. They are gregarious, and, as Col. Sykes states, polygamous; for he never saw them solitary or in

The instrument is furnished with a stop or strap, so that after the distance is measured, the perambulator may be conveyed without the index being altered.

Unlike the pedometer, it requires no regulating, and the only risk of its giving the distance incorrectly, if well constructed, is in passing over rugged and uneven roads, which will of course cause the index to show more than the true distance. In general however, for short distances, this error is very trifling.

When about to commence a measurement, the wheel should be turned round until the first-mentioned index points to 220 on the circle of yards. Some are provided with a click and racket, by which this may done with much less trouble than by the wheel.

There are other instruments for the same or similar purposes, bearing different names, as *waywiser* and *odometer;* but the construction of all of them is very similar.

Waywiser is the name generally given to that form of the instrument which is applied to a carriage, in which, by a slight adaptation to one of the wheels of the carriage, the instrument is made to register the number of turns of such wheel, in the same manner as the perambulator.

PERAME'LES. [Bandicoot; Marsupialia, vol. xiv., p. 437; and see further Professor Owen's paper 'On the Osteology of the Marsupialia' (*Zool. Proc.*, 1838).]

PERCEPTION is that power or act of the mind by which it holds communication with the external world. It is distinguished from *conception* by the circumstance that its objects are in every instance supposed to have an actual existence. We may conceive things that have no reality, but we are never said to perceive such things. Perception differs from *consciousness* in that it takes cognisance only of objects without the mind. We *perceive* a man, a horse, a tree; when we think or feel, we are *conscious* of our thoughts and emotions. It is further supposed in perception that the objects of it are present. We can *remember* former objects of perception, but we do not perceive them again until they are once more present. Besides the sense which has been explained, the term perception is sometimes analogically employed in common speech in reference to truths the evidence of which is certain. Thus we may perceive the truth of a mathematical proposition. But Mr. Hume is perhaps the only writer of eminence who designedly applies the word in a metaphysical disquisition with a meaning different from that which has been here assigned to it. By him it is applied indiscriminately to all the operations and states of the mind; passions being designated perceptions, and the acts of memory and imagination converted into so many acts of perception. Such latitude of phraseology confounds under one general name things essentially distinct, and tends to introduce vagueness and inaccuracy into a department of philosophical investigation where definiteness and precision are peculiarly indispensable.

The distinction between things *perceived* (*αἰσθητά*) and things *conceived* (*νοητά*) was familiar to the Greek philosophers and to their Latin expositors, of whom Cicero expresses the former class of things by the phrases 'quæ sunt,' 'quæ cerni tangive possunt;' and the latter by the phrases 'quæ tangi demonstrarive non possunt, cerni tamen animo atque intelligi possunt,' and gives examples of each. (*Top.*, v.)

The perceptive faculty is exercised through the instrumentality of the senses. We see by means of the eye, and hear by means of the ear, and so in reference to the other senses. An individual in whom these organs are wanting or defective, will either not perceive at all, or perceive imperfectly. In order to perception it is requisite that an impression should be made on the organ of sense, either by the direct application of the object, or through some medium that communicates with the object and the organ. Thus an immediate application is necessary with regard to the senses of taste and touch; but only an intermediate one with regard to those of sight, hearing, and smell. The impression made on the organs of sense affects the nerves, and is by them conveyed to the brain. The necessity of this communication is ascertained by observation. If the nerve appropriated to any organ be cut or tied hard, no perception takes place; and the same result is noticed in certain disordered conditions of the brain, even though the organs of sense and the nerves perform their respective functions. When however the conditions that have been specified are complied with, perception ensues.

Various theories have been formed to explain the functions of the nerves and brain in connection with perception. It was imagined by the antients that the nervous fibres are tubular, and filled with a subtile vapour named animal spirits; that the brain is a gland by which this æthereal fluid is secreted; and that by means of it the nerves perform their office. (Reid, *Essay* ii., ch. 3.) Des Cartes, who adopted this hypothesis, has described with great minuteness how all mental operations and movements are accomplished through the agency referred to. Dr. Briggs, Newton's instructor in anatomy, was the first who proposed a new doctrine on this point. He maintained that the nerves operate by vibrations, like musical chords, and thus conduct impressions to the brain. Newton himself (*Opt.*, qu. [illegible]) appears to have been inclined to a notion of this kind and the suggestions relating to it thrown out by him as a query were afterwards amplified and defended by Hartley. The latter supposed that 'external objects impressed on the senses occasion, first in the nerves on which they are impressed and then in the brain, vibrations of the small, and, as one may say, infinitesimal medullary particles;' and that these vibrations are excited, propagated, and kept up partly by the ether, that is, by a very subtile elastic fluid, partly by the uniformity, continuity, softness, and active powers of the medullary substance of the brain, spinal marrow, and nerves.' (*Observations on Man*, part i., prop. 4.) Both Des Cartes and Hartley believed that by the action of the nerves in the manner described by them, images of external objects were formed in the brain.

It is scarcely necessary to remark concerning these hypotheses that they are totally destitute of foundation. A sound theory must assign real and not imaginary causes for the phenomena which it professes to explain; and such causes must have a manifest competency to the effects ascribed to them. But the hypotheses in question entirely want both of these essentials. Who can prove the existence of the animal spirits of Des Cartes, or the vibrations of Hartley; or, granting their existence, who can show any correspondence between them and the formation of images in the brain? All we can affirm with certainty respecting the means of perception is, that, under certain circumstances, that is, when an impression is made on the bodily organs and communicated by the nerves to the brain, perception takes place. The impressions so communicated are the occasions of the mind perceiving, but we can assign no reason why it should do so under these circumstances invariably, and not under any other, further than that such is the constitution of our nature.

If the act of perception be examined, it will be found that we obtain by it a certain amount of information respecting the object perceived. We discover that it has particular qualities, as for example, that it is extended, that it has figure, that it is hard or soft, rough or smooth, &c. The notion thus formed may vary in respect of distinctness in all possible degrees. In the light of twilight a body is discerned more obscurely than in the full light of noon day, and more obscurely still in proportion as the darkness deepens. The notion we get of an object by perception is accompanied by an irresistible and immediate conviction of its real existence. An object may indeed be perceived so indistinctly as to leave us in doubt whether it be real or not. If it be very distant, or involved in darkness, this may happen. But when it is plainly perceived, there is, along with the perception, a perfect conviction of its reality. We can no more doubt of its existence than we can of our own. And this conviction is immediate. It is not the result of a process of reasoning founded on our perceptions, but inseparably connected with them, and as instantaneous as the assent rendered to axiomatic truths. It may be also remarked that the belief in the existence of the objects of perception is not more immediate and deeply rooted than is the belief that they exist externally to us. They do not seem to have their place in the mind itself, but to exist independently of it altogether. These statements accord with the universal experience of mankind, and may be verified by all who choose to bestow the slightest attention on the intimations of consciousness.

It would be a tedious as well as a useless task to dwell minutely on the numerous theories that have been framed of perception. In certain important particulars nearly all of them coincide; while in others, equally if not more important, they are for the most part at variance.

Democritus taught that perception was the result of the impressions made on the organs of sense by images (εἴδωλα), which constantly emanated from bodies, and varied according to the conformation of their originals. (*Plut., Phys. Phil.*, l. iv., ch. 8, &c.)

Plato, in the seventh book of his 'Republic' (ad init.) illustrates the manner in which we perceive objects, by the figure of a cave, in which men lie bound, so that they can turn their eyes only to one part of it, where rays from a distant light stream in, and shadows of bodies, supposed to pass between them and the light, are beheld, the bodies themselves being invisible. He thus conceived that we perceive only the shadows of things, and not things themselves.

This opinion of Plato was substantially the same with that of his scholar Aristotle, and of the Peripatetics generally. Aristotle (*De An.*, l. iii., c. 2, 3) taught that as the senses cannot receive material objects themselves, they receive their images. These images are the only objects of perception in the mind. As impressed upon the senses, they are termed sensible species; more spiritualised, they become objects of memory and imagination, and are termed phantasms; still further refined, so as to be objects of science, they are named intelligible species.

The theory of Epicurus was little other than a modification of that of Aristotle. He supposed that bodies are continually casting off from their surfaces slender films or species of such subtlety that they easily penetrate by the senses to the brain. (Lucret., l. iv. v. 34, 46, &c.)

Locke employs an illustration of the manner of perception that appears to have been borrowed from that of Plato—'Methinks,' he says, 'the understanding is not much unlike a closet wholly shut from light, with only some little opening left to let in external visible resemblances, or ideas of things without. Would the pictures coming into a dark room but stay there, and lie so orderly as to be found upon occasion, it would very much resemble the understanding of a man in reference to all objects of sight and the ideas of them.'

The similitude of Locke, or rather of Plato, may be applied to all the systems of perception that have ever been formed, by merely substituting ideas, and, in the case of Hume, impressions, for what were anciently denominated species and phantasms. All these theories agree in maintaining that images are the only immediate objects of perception to the mind. Hume, Berkeley, and others indeed hold that these are the exclusive objects; but the common hypothesis admits the existence of things of which these are but the representatives, and which we mediately discern. It may be sufficient to remark concerning these opinions, that they are diametrically opposed to the testimony of our own consciousness. Instead of informing us that images alone are the direct objects of our perception, consciousness intimates nothing respecting images at all. Unless its representations are altogether deceptive, it is not things within the mind, but things external to it, that we perceive; not images of objects, but the very objects themselves. This is testimony to which we yield instinctive assurance. It is too cogent and unquestionable to be set aside by reasoning of any kind, far less by reasoning based upon certain imagined relations subsisting between matter and spirit which we are incapable of apprehending; and the application to mind of laws which apply solely to the objects of physical investigation.

One observation, intentionally deferred, remains still to be made respecting perception, namely, that it is greatly modified by habit and by the cultivation and development of the other powers. Thus the perceptions of a man and those of a child, both contemplating a piece of complex machinery, the one being aware of its principles and arrangements, the other completely ignorant of them, must in some respects considerably differ. In like manner the perceptions of a blind man, by means of those organs of sense which are unimpaired, are distinguished in many particulars from those of the individual who has never been without the faculty of vision. Numerous instances of a similar kind might easily be specified. A full account of acquired perceptions, such as those alluded to, is still a desideratum in this department of philosophical inquiry.

PERCH or **POLE**. This measure, though now mostly used as a square measure (a perch usually meaning a square perch, or a square of a perch in length and breadth), was originally a measure of length, arising out of the custom of measuring small portions of land by a staff or pole. The word *pertica*, from which it comes, means a wooden staff. But the pole with which land was measured not only differed very much in different countries, but in different parts of the same country. Ducange and his editors find records of the use, in different parts of England and France, of perches of 7½, 10 (the oldest English), 12, 15, 16, 18, 20, 21, 22, 25, and 27 feet. Here is but another instance (as in MILE and LEAGUE) of the tendency of measures to lengthen. Forty perches (quarentena), under the name of forty-long or furlong, became a common measure of length; and a piece of land forty perches long and one deep, was called *perticata*. (Spelman, cited by Ducange.) Thus the perch and furlong, though afterwards received into the system of measures which ends with the mile, originally formed no part of it whatever. (MILE.*)

By an early statute, entitled 'Compositio Ulnarum et Perticarum,' the perch was fixed at 16½ feet, or five yards and a half; and four perticatæ (though that word is not used) were defined as an acre.

A perch is the quarter of a chain, and a square perch contains 30¼ square yards.

PERCHE, LE, a province of France, united, before the Revolution, with Maine, into one military government. It was bounded on the north by Normandie, on the north-east by the Ile de France, on the east and south by Orléanais, and on the west by Maine. It was subdivided into Le Grand Perche, or Le Haut Perche (Great or Upper Perche), of which Mortagne was the capital; Le Perche Gouet, or Le Bas (Lower) Perche, of which Montmirail was the capital; Les Terres Françaises, of which Tour-Grise-de Verneuil was the capital; and Les Terres Demandées, or Thimerais, of which Châteauneuf-en-Thimerais was the chief town. Perche is now comprehended in the departments of Orne, Sarthe, and Eure et Loir.

Le Perche was under the government of its own counts from the year 940; but the original county was not equal in extent to the province of later times. Having fallen to the crown, this county was given with that of Alençon to Pierre, one of the younger sons of St. Louis (A.D. 1269); but these counties having on his death reverted to the crown, they were again bestowed on Charles de Valois, brother of Philippe le Bel (A.D. 1293), in whose family they long continued. In 1361 they were separated, Perche going to a younger branch of the family; but in 1404 they were again united.

In the reign of François I. the county was, on the death of the last male heir, seized by the crown, but the justice of the claim was for awhile disputed. During the dispute the widow of the late count was allowed to possess the county, but it was afterwards annexed to the crown domains.

PERCIDÆ, or *Percoïdes* of Cuvier, a family of Acanthopterygious fishes, of which the common perch may be regarded as the type, that is to say, the fishes of this great group, which might perhaps to be regarded as an order rather than a family, all more or less approach the common perch in general form; they have the body covered with scales whose outer surface is more or less rough, and the free margins of which are denticulated; the operculum and preoperculum are variously armed with spines and denticulated at the outer margin; they not only have teeth in both jaws, but the vomer and palatine bones are also furnished with them; the number of rays in the branchiostegous membrane varies from five to seven; they never fall short of the lower nor exceed the higher number. The flesh of these fishes is generally well flavoured and wholesome. They inhabit both salt and fresh water.

The first division of the Percidæ, according to Cuvier, comprises all those species which have the ventral fins placed under the pectorals, five soft rays to the ventral fins, seven branchiostegous rays, and two dorsal fins. This section includes the following genera:—

1. *Perca* proper, in which the preoperculum is denticulated; the operculum is produced behind into a flattened spine; the infra-orbitals are obscurely denticulated, and the tongue is smooth. Example, the common perch (*Perca fluviatilis* of Linnæus). (Yarrell's *British Fishes*.) Closely allied to this is the *P. Italica* of Cuvier and Valenciennes, a species found in tolerable abundance in some parts of Italy; it differs from the *Perca fluviatilis* in being of a shorter and deeper form, and is destitute of the black bands. Several true perches are found in North America; species have also been discovered in Java and New Zealand; it is highly probable therefore, from the extensive geographical range of the perches proper thus exhibited, that very many species still remain to be discovered.

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* In this article (p. 213) 'perticatæ' is erroneously written for 'pertica.'

keeper would, we doubt not, soon have a young brood to show, and that once obtained, he would not be long before he would be able to turn out these graceful birds, whose habits appear to be similar to those of the Quails and some of the Partridges.

Hemipodius. (Temm.)

Generic Character.—*Bill* moderate, slender, straight, very much compressed, curved towards the point; *nostrils* basal, lateral, linear, slit longitudinally down to about the middle of the bill, and partially closed by a naked membrane. *Tarsus* long; only three toes, all of which are directed forwards and entirely divided. *Tail-feathers* weak, hidden by the upper coverts. *Wings* moderate; first *quill* longest.

This is the genus *Turnix*, Bonn.; *Tridactylus*, Lacép.; and *Ortygis*, Ill.

Geographical Distribution and Habits of the Genus.—Europe, Asia, Africa, Australia, and Oceania.

Mr. Swainson makes the genus *Ortygis* the third of his family *Tetraonidæ*, and places it between *Odontophorus* and *Tetrao*. Mr. G. R. Gray elevates the form into a subfamily, under the name of *Turnicinæ*, the first of his family *Tinamidæ*, the second and only other subfamily being *Tinaminæ*. The *Tinamidæ* are followed by the *Struthionidæ* in his arrangement. Colonel Sykes, in his paper *On the Quails and Hemipodii of India*, speaking of *Hemipodius pugnax*, says that its muscular stomach and proportionally long intestines, compared with *Otis*, would prevent its being placed in that genus; but its cursorial habits and the form of its bill would justify its displacement from the *Tetraonidæ*, and it might come in after *Otis* in *Struthionidæ*. The food of the genus consists of insects and seeds, and the birds generally frequent high herbage, in which they run with great speed. We proceed to give Asiatic and African examples of this genus.

Asiatic.

Colonel Sykes, in his paper above alluded to, describes three species—*Hem. pugnax*, *H. Taigoor*, and *H. Dussumieri*. In the stomach of the first he found the remains of black ants, minute coleopterous insects, and grass-seeds; the flesh was in brown and white layers, and the Colonel states that its pugnacious qualities are quite unknown in Dukhun, and even in Java. They were frequently in pairs, but mostly solitary, haunting cultivated lands, especially chillee fields (*capsicum annuum*). Their flight he describes as lazy and short, nor are they readily put on the wing. He adds that the Zoological Society has a specimen from Madras, and that it would appear therefore to have an extended geographical range over the Eastern islands and India. We shall presently notice *H. Taigoor*. Of *H. Dussumieri*, the *Button Quail* of European sportsmen in India, he says that it affects short thick grass and fields of pulse of *Dolichos biflorus*, *Phaseolus Max.*, and *Ervum Lens*. He never found the bird otherwise than solitary, and says that it is so difficult to flush, that it not unfrequently rises from beneath the feet; and when on the wing, its flight is so abrupt, angular, and short, that it is generally down before the gun is well up to the shoulder.

Turnix Taigoor. (Sykes.)

Example, *Hemipodius Taigoor.*

Description.—Chestnut above; feathers margined with straw colour, and with undulated bands of black; wing coverts straw-colour banded with black; quills brown, chin and throat white, breast banded with black and white, belly and vent dilute ferruginous, irides pale yellow, bill blackish. Length of the body four inches eight-tenths, of the tail one inch seven-tenths. (Sykes.)

Colonel Sykes was at first disposed to regard this species as *H. pugnax* in an immature state; but subsequent observations induce him to consider it as distinct. The measurements correspond closely with those of *H. pugnax*, but it is on the whole less robust.

In the species of *Turnix*, or *Hemipodius*, described by Colonel Sykes, the sexes do not appear to differ in plumage.

African.

Example, *Hemipodius Lepurana.* (Smith.)

Description: Colour. (*Male.*)—Above, the ground-colour is intermediate between pale rufous and light chestnut: on the upper surface of the head the feathers are indistinctly barred with brown; on the neck, back, and shoulders nearest to the body, they are crossed by numerous slender black-brown bars or irregular crescents, and some of the shoulder-coverts are besides delicately margined with white. The eyebrows, sides of the head, and a stripe between the base of the bill and nape of the neck rusty white, the feathers of the two first finely tipped with brown. The inner vanes of the secondary quill coverts pale rufous; the outer vanes straw yellow inclined to white, and each of the latter is crossed obliquely near its point by a well-defined brown bar, the inner extremity of which terminates in an acute point. Primary quill coverts dark brown; the primary and secondary quill feathers greyish brown, the outer vanes of the former finely edged with a pale buff colour, those of the latter broadly edged with cream yellow, and partially barred with the same colour. Tail pale rufous, and crossed by numerous delicate waved brown lines. Chin and throat dull white; the middle of the breast pale Dutch orange, with a few minute brown dots; sides of the breast and belly white, with a yellowish tinge, each feather with an arrow-shaped brown spot near its point; centre of the belly and the thighs white; vent and under tail-coverts very pale buff orange; bill and legs pale lilac; eyes [illegible] reddish-yellow.

Form, &c. typical; bill moderately long and slender; form approaching that of the smaller Rails (*Porzana*, Vieill.); tail rather elongated, graduated, and pointed; wings, when folded, reach nearly to the commencement of the last half of the tail; the first, second, and third quill feathers longest and nearly of equal length; the tertials slightly shorter than the longest quill feathers; tarsi [illegible] slender, in front coated with two rows of scales, and behind with one row; toes short; claws slender and slightly curved; the thighs closely covered with feathers to the knee joint. Length, from the point of the bill to the tip of the tail, [illegible] inches.

Female.—The crown of the head sparingly sprinkled with white dots, otherwise as in the male; the back of the [illegible] is pale cinnamon-brown, the feathers edged with white; back a pale fawn colour, each feather crossed by several black bars, and each bar with a more or less distinct angular projection at the shaft of the feather both before and behind, or simply behind; secondary wing coverts pale cream-yellow, each with an oblong deep brown spot on its outer vane, and a large irregular chestnut blotch on the inner continuous with the brown spot. Primary and secondary quill feathers brown, the two outermost primaries being margined with cream-yellow, the rest of the primaries and the secondaries delicately edged with pale rufous; the tertiaries pale chestnut barred with black, and here and there variegated besides with small and irregularly shaped white spots or stripes; the middle of the breast as in the male, but the sides, instead of being marked with angular spots, have them of an ovate form, and placed longitudinally on the feathers. (Smith.)

Locality, Habits, Food, &c.—Only a very few specimens of this quail, says Dr. Smith, were obtained, and these [illegible] until after the expedition had reached the country north of Latakoo. The grassy valleys south-east of Kurrichane were the only localities in which they were discovered, and even then they appeared to be but thinly scattered, for more than a single individual was seldom found in or even near the same place. When the birds were disturbed, they seldom flew far before they alighted, upon which it would seem that they continued their retreat, for none of those flushed a second time were ever found near the situations where they had been marked down. The food consists of seeds and small insects, with which the birds swallow a considerable quantity of fine gravel.

Turnix Lepurana, female. (Smith.)

Dr. Smith remarks that in the museum of the Army Medical Department at Fort Pitt, Chatham, there are the male and female of an Indian species of *Hemipodius* very closely resembling the Dr.'s *Hemipodius Lepurana*. They differ however, he observes, in so many minor points, that he feels disposed to regard them as belonging to a distinct species. In the catalogue of the Fort Pitt collection, Dr. Smith has named this Asiatic species *Hemipodius Sykesii*, in honour of Col. Sykes, who, he justly states, has added so much to our knowledge of the zoology of India. (*Illustrations of the Zoology of South Africa.*)

Before we quit this sketch of the Partridges and Quails, we must notice two forms which particularly demand attention as leading to other types. The first of these, the *Sanguine Partridge*, *Perdix cruenta* (*Pl. Col.*, 332), appears to bear the following generic names: *Ithaginis*, Wagler, *Plectrophorus*, J. E. Gray, and *Pitiquerius*, [illegible]. It is described as a pheasant in 'Linn. Trans.,' vol. xiii., and may be considered as uniting the Partridges with the *Pheasants* and the *Polyplectrons*, like the latter of which, it has often more than one spur upon the tarsus. The plumage of this bird, which is a native of Nepaul, is brilliant, and the feathers of the head and neck are elongated.

The *Perdix Lerwa* described by Mr. Hodgson (*Zool. Proc.*, 1833) inhabits, according to that gentleman, the northern region of Nepaul, and forms by its half-plumed tarsi a sort of link between the *Partridges* and the *Grouse*, the latter of which it resembles in its habits. It is found close to the permanent snows, among rocks and low brushwood, feeding upon aromatic buds, leaves, and small insects. The plumage is black, lineated transversely with white and chestnut; the breast is brown. Mr. Hodgson remarks that the great comparative expanse of the wing, the diminution of its rounded form by the second quill feather being the longest, the increased length and strength of the tail, and the extent of the feathering of the tarsi, are very remarkable characters, which give to this species a strong [illegible].

PERDICINÆ. [PERDICIDÆ.]

PERDIX (Ornithology). [PERDICIDÆ.]

PERDIX (Conchology), De Montfort's name for the *Partridge Tun* (*Dolium Perdix* of authors). [ENTOMOSTOMATA, vol. ix., p. [illegible].]

PERDU, MOUNT. [PYRENEES.]

PEREKOP. [CRIMEA.]

PERENNIBRANCHIATA. [AMPHIUMA; AXOLOTL; PROTEUS; [illegible].]

PEREZ, ANTONIO, was the natural son of Gonzalo Perez, a distinguished writer* and statesman who had been for forty years sole secretary of state to Charles V. and Philip II. After the death of his father, whom he used to assist in his administrative duties, Antonio was appointed by Philip to succeed him in that charge. At first the confidence which his sovereign placed in him, and the favours lavished upon him seem to have been unbounded, but he soon experienced the inconstancy of royal favour. John of Austria, an illegitimate son of Charles V., elated with his victories over the revolted Moors of Granada [MORISCOES], and still more by the glorious victory of Lepanto (1571), could not rest contented with the second place in the kingdom, and nothing short of a throne would satisfy his ambition. At first he solicited his brother to grant him the kingdom of Tunis to be held as a fief of the Spanish crown. A marriage with Elizabeth of England, the sworn enemy of Spain, was also seriously contemplated, and negotiations were carried on to that effect by his secret agents. It has even been surmised that he meditated at one time to put himself at the head of the rebels of Flanders. The soul of these intrigues as well as the promoter of John's ambitious designs was his secretary, Juan de Escovedo, notwithstanding he had been appointed to that office by Philip for the express purpose of counteracting them. No sooner therefore had Escovedo arrived at court for the purpose of furthering his master's views, than Philip, who was already acquainted with the whole intrigue, decided upon his ruin; but unwilling, from motives of state, to try him by the common forms of law, he committed to Perez the execution of his wishes. Accordingly, and in compliance with Philip's orders, Perez hired some assassins, who murdered Escovedo in March, 1578. A few months after the perpetration of this crime, Philip ordered Perez to be arrested at the same time with Doña Ana de Mendoza, princess of Eboli, the supposed object of the king's affection; in all appearance to yield to the solicitations of Escovedo's relatives, and the threats of John of Austria, but in reality from other motives, which, though we may guess at them, are far from being satisfactorily known. In his *Relaciones*, published several years after the tragedy, Perez treated at length of all these events, but such was his dread of Philip that he always expresses himself in very ambiguous and enigmatic terms, and the whole transaction remains wrapped up in mystery. It has been supposed by some that Perez was imprudent enough to communicate his secret to the princess, whom he used to visit without the knowledge of his master, and to hint at the king's implication in the murder of Escovedo; by others, that Philip was an unsuccessful suitor to the princess and jealous of the intimacy of Perez with her. Be this as it may, Perez was delivered into the hands of justice, a pretended investigation was instituted into his conduct, and the result was that he was condemned to two years' imprisonment, eight years' exile from court, and a heavy fine. At first his own house was assigned as his place of confinement, Philip still continuing to employ him and to promise him his protection and favour; but that wily monarch having, it is asserted, through threats and promises, obtained from him what he most wanted, namely, all the papers that might prove his own share in the murder, Perez was by his orders removed to a prison, and soon after put to the rack, where he confessed his participation in the murder of Escovedo, but at the same time stated that he received the king's orders to that effect. Perez would undoubtedly have suffered capital punishment, had not his wife Doña Maria de Coello, assisted by his friends, procured him the means of escaping from his prison, and taking refuge in Aragon his native province. On arriving at Saragossa, Perez appealed, in virtue of the Aragonese laws, to the protection of the Justiza, and insisted upon a fair and open trial; but Philip, regardless of the authority of the Justiza, of the people's liberties, and his own oaths to maintain them, commanded the magistrates of Calatayud to seize the secretary and confine him in the royal prison. At this arbitrary violation of their constitution the people of Saragossa rose in arms, and by force released the prisoner. A third and last expedient was then tried by Philip. As Perez was known to be in correspondence with Catherine, the sister of Henri IV. of France, and a Protestant, he was accused of heresy and witchcraft, and lodged in the dungeons of the Inquisition. The patriotic Justiza protested against this new infraction of the people's privileges, and the inhabitants of Saragossa, infuriated to the last degree, invaded the palace of the Inquisition and released the prisoner, after putting to death the Marquis de Almenara, Philip's representative, and committing other excesses. No sooner did Philip hear of the revolt, than he ordered a considerable army to Aragon. The Saragossians rose in arms: a tumultuous body, headed by Don Martin de Lanuza, the Justizia, went out to meet the royal troops, but having hastily fled at their approach, the unfortunate nobleman was taken prisoner and immediately executed, the forms of liberty being thus for ever extinguished in Aragon. In the meanwhile Perez made his escape into France, where he published the narrative of his sufferings and found protection. He also visited England, and was kindly received by Elizabeth's ministers, and other illustrious men of the time, such as the Earl of Essex, Lord Southampton, Francis and Anthony Bacon, &c., with whom he maintained a correspondence in Latin. He seems even to have entertained an idea of going to Scotland, as appears from a letter of his to James VI., and another addressed to him by Thomas Parry, which are preserved in the library of the British Museum among the Cotton MSS., Caligula, E. vii. During Perez's stay in France several unsuccessful attempts were made by Philip to have him assassinated. Estoile (*Journal de Henry IV.*, vol. ii., p. 253) says that a Spaniard, named Rodrigo Mur, was executed at Paris in 1596 for attempting to murder Perez, and that when he was put to the rack, he confessed that he was sent by Idiaquez, minister of Philip II. Perez died, miserably poor, at Paris, on the 3rd November, 1616, and was buried in the monastery of the Celestins, where his tomb, bearing a Latin epitaph, was still to be seen shortly before the Revolution. Besides his *Relaciones*, which appeared for the first time at Paris in 1598, and were afterwards reprinted there in 1624, and at Geneva in 1631, 1644, and 1654, and his *Cartas y Aphorismos*, published at Paris in 1603 and in 1605, besides other subsequent editions without date, Perez is said to have written a history of Philip II., and some political works. There is also a collection of letters by him addressed to the Connetable de Montmorency, preserved in the royal library at Paris. Part of the former work was translated into French and also into Latin, with this title, *Institutiones Imperiales*, Amst., 1657.

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* He [illegible]

(Watson's *Philip II.*, vol. iii.; Ferreras, *Synopsis Historial*, vol. x., part 16; Cabrera, *Historia de Felipe II.*, Mad., 1619; Vanderhammen, *Historia de Don Felipe el Prudente*, Granada, 1649; Nicolas Antonio, *Bibl. Nova*, tom. i.)

PE'RGAMOS, or PERGAMUM (Πέργαμος, Πέργαμον), the most important town in Mysia, is first mentioned in Xenophon's 'Anabasis' (vii. 8, s. 8). It was strongly fortified by nature and art, and was chosen by Lysimachus as the most secure place in his dominions for depositing his treasures. He committed the charge of them to Philetærus, a native of the small town of Teium in Pontus (Strabo, xii. 543), who remained faithful to his charge for some time; but having been injuriously treated by Arsinoe, the wife of Lysimachus, he declared himself independent about B.C. 283, and remained master of the town and a small part of the surrounding country till his death, B.C. 263. (Strabo, xii. 623.) He was succeeded by his nephew Eumenes, who increased his dominions, and even gained a victory near Sardis over Antiochus, son of Seleucus. He reigned for 22 years, and was succeeded, B.C. 241, by his cousin Attalus I., whose father was the younger brother of Philetærus. (Strabo, xii. 624.)

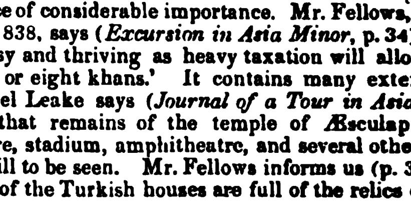
Attalus was the first of the rulers of Pergamos who received the title of king. He was a successful general, and his prudence as well as valour greatly extended the limits of his kingdom. He conquered the Galli-Græci, or Galatians, and afforded effectual assistance to the Romans in their wars against Philip of Macedon. He died at the age of 72, after a reign of 44 years, and was succeeded, B.C. 197, by his son Eumenes. (Polyb., xviii. 24; Liv., xxxiii. 21; Strabo, xiii. 624.)

Eumenes continued, like his father, a firm friend of the Romans, and in consequence of his services in their wars against Antiochus and the kings of Macedonia, he received from them all the territory conquered from Antiochus on this side of Mount Taurus. Previous to this, the territory of the kings of Pergamos did not extend beyond the country bordering on the gulfs of Adramyttium and Elæa. (Strabo, xiii. 624; Liv., xxxviii. 39.) Eumenes was a warm patron of the arts and sciences. He embellished the city with many public buildings, and founded a library, which became only second in importance to that of Alexandria. In consequence of the prohibition against exporting papyrus issued by Ptolemy, he is said to have invented parchment (Plin., *Hist. Nat.*, xiii. 21), but this material was probably known before his time. [PARCHMENT.] The library remained at Pergamos till Antonius made a present of it to Cleopatra. (Plut., *Ant.*, c. 58.) Eumenes was distinguished, according to Polybius (xxxii. 23), by many eminent qualities, and left his kingdom in a very flourishing state. He died B.C. 159, after a reign of 39* years, leaving an infant son to the care of his brother Attalus II., who administered the affairs of the kingdom with great success for 21 years. He was succeeded by Attalus III., the son of Eumenes, who died after a reign of five years, B.C. 133, leaving his property by will to the Romans, which they interpreted to mean the kingdom of Pergamus. (Liv., *Epit.*, 50; Plut., *Tib. Gracch.*, c. 14.) The kingdom however was claimed by Aristonicus, a natural son of Eumenes; but he was defeated and taken prisoner by the Romans, B.C. 129, and the kingdom became a Roman province under the name of Asia. (Strabo, xiii. 624.)

The history of the kings of Pergamos is given in an Appendix to Clinton's *Fasti Hellenici* (vol. iii., p. 400-410). Compare the article ATTALUS in this work.

Pergamus was situated north of the river Caicus (*Ak-su* or *Bakir*). The small river Selinus flowed through it. (Plin., *Hist. Nat.*, v. 33.) The citadel, which was very strongly fortified, was built on a hill of a conical shape. The town itself was very large, and possessed many public buildings, of which the most celebrated was a temple of Æsculapius, which possessed the right of asylum. (Tac., *Ann.*, iii. 63; App., *Mith.*, c. 60.) Pergamos was one of the seven churches to which St. John wrote in the book of the *Revelation* (i. 11; ii. 12). It continued to be the capital of the Roman province of Asia. Pliny (*Hist. Nat.*, v. 33) calls it by far the most celebrated town in Asia (that is, the province of Asia). The modern town, which is called Bergma, is still a place of considerable importance. Mr. Fellows, who visited it in 1838, says (*Excursion in Asia Minor*, p. 34) that 'it is as busy and thriving as heavy taxation will allow, and has seven or eight khans.' It contains many extensive ruins. Colonel Leake says (*Journal of a Tour in Asia Minor*, p. 266) that remains of the temple of Æsculapius, of the theatre, stadium, amphitheatre, and several other buildings, are still to be seen. Mr. Fellows informs us (p. 34) that the walls of the Turkish houses are full of the relics of marbles with ornaments of the richest Grecian art.

The name Pergamus signifies 'a hill' or 'elevated place,' and the word is used by Homer (*Il.*, iv. 508) to express the acropolis of Ilium. The relationship of the word Pergamus to the Greek pyrgos (πύργος) and the Teutonic *berg* is obvious. The names of the towns Berge in Thrace and Perge in Pamphylia contain the same element *berg*. Compare also Herod. vii., 43, 112.



Coin of Pergamos.
British Museum. Actual Size.

PERGE. [PAMPHYLIA.]

PERGOLE'SI, GIOVANNI-BATTISTA, was born, according to Dr. Burney—who drew his information from persons well acquainted with the composer—at Casoria, near Naples, in 1704; Mattei says, at Pergola, in 1707. Sir John Hawkins makes it 1718; though it is evident that in this instance he was not so correct as usual. But in the *Gazette Musicale*, No. 49, it is stated that the Marchese di Villarosa had (recently, we conclude) published a *Lettera Biografica* concerning this very eminent Italian musician, in which he tells us, on the authority of a baptismal register, that he was born at Jesi, in 1710. Nevertheless the presumption is in favour of the English historian, as it is possible that the registration discovered by the marquess may have been that of some other person of the same name. All agree however that Pergolesi was educated at the Neapolitan *Conservatorio dei Poveri in Giesu Cristo*, under Gaetano Greco and Durante, and that at the age of fourteen, fully per-

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[*] Strabo (xiii. 624) says 49, but this must be a mistake. See Schweigh. 'Ad Polyb.,' xxxii. 23; and Clinton's 'Fast. Hell.,' vol. iii., p. [illegible]

cluded that melody and true taste were sacrificed to what was called learning, he was withdrawn, at his own request, from school, and immediately adopted the style of Vinci and Hasse. His first productions, among which was Metastasio's *Olimpiade*, were coldly received, both at Naples and Rome, for his new manner was not understood. But the *Prince di Stigliano*, discovering his merit, procured an engagement for him at the *Teatro Nuovo*. There his light but elegant intermezzo, *La Serva Padrona*, which afterwards made so extraordinary a sensation in Paris, was brought out in 1731.

Though the dramatic compositions of Pergolesi met with little success during his short life, his productions for the church were duly appreciated, and received with the applause they deserved. His fine mass in D, in which is the no less popular than beautiful movement, 'Gloria in excelsis!' was heard 'with general rapture,' says Burney, at Rome; where also his grand motet, 'Dixit Dominus,' and his 'Laudate, Pueri,' were equally admired. At this time he began to show decided symptoms of pulmonary disease, and removed, for change of air, to Torre del Greco, at the foot of Vesuvius. Here he composed his lovely and most pathetic 'Stabat, Mater,' a Catholic hymn; likewise the motet, 'Salve, Regina' his latest work. He died in 1737, at nearly the same period of life that bounded the earthly existence of Raffaelle, Purcell, and Mozart. 'The instant his death was known,' Dr. Burney remarks, 'all Italy manifested an eager desire to hear and possess his productions, not excepting his first and most trivial farces and *intermezzi*: and not only lovers of elegant music, and curious collectors elsewhere, but even the Neapolitans themselves, who had heard them with indifference during his life-time, were now equally solicitous to do justice to the works and memory of their deceased countryman.' (*Hist.*, v. 551.)

According to Walpole, Gray the poet first made Pergolesi's works known in England. It is certain, that he considered them as models of perfection,—a fact mentioned to Dr. Burney by Walpole, Mason, and other friends of the great British poet. Pergolesi's opera, *L'Olimpiade*, was first performed at the King's Theatre in 1742; the *Serva Padrona* in 1750. His sacred compositions were performed at the Academy of Ancient Music shortly after they reached this country, and have never since ceased to be admired by all true lovers and judges of the art.

PERIANDER. [CORINTH.]

PERI'BOLUS (Conchology), a genus of Gasteropods founded by Adanson on young cowries, the outer lips of whose shells were trenchant and not yet come to their permanent form. [CYPRÆIDÆ, vol. viii., p. 224, fig. *a*, *b*.]

PERIBOLUS. [TEMPLE.]

PERICA'RDIUM. [HEART.]

PERICARDI'TIS. [HEART, DISEASES OF.]

PERICARP is strictly the shell of a seed-vessel, varying very much in texture, as between the grape, where it is fleshy, the bean, where it is hard and dry, and the peach, where it is succulent externally and stony in the inside, but in these cases always originally the simple sides of a free carpel. In practice however the term pericarp is also applied to those seed-vessels whose sides are formed of the floral envelopes and stamens in a state of adhesion to the carpel, as in the apple, gourd, &c. When the pericarp separates into distinct layers, those layers have sometimes separate names, as in the plum, whose external skin is the *epicarp*, whose pulp or flesh is the *sarcocarp*, and whose stone is the *endocarp*, or *putamen*. In such cases the endocarp answers to the upper epidermis and parenchyma of the carpellary leaf, the sarcocarp to the mesophyllum, and the epicarp to the inferior epidermis.

PERI'CERA. [MAIIDÆ, vol. xiv., p. 291.]

PERICHÆTIUM is a name given by writers on mosses to the leaves that surround the bulbous base of the stalk or seta of the seed-vessel, or sporangium.

PE'RICLES (Περικλῆς) was son of Xanthippus, who defeated the Persians at Mycale, and of Agariste, niece of the famous Clisthenes. (Herod., vi. 131.) He was thus the representative of a noble family, and he improved the advantages of birth by those of education. He attended the teaching of Damon, who communicated political instruction in the form of music lessons; of Zeno the Eleatic; and, most especially, of the subtle and profound Anaxagoras. Plutarch's account shows that he acquired from Anaxagoras moral as well as physical truths, and that while he learned enough of astronomy to raise him above vulgar errors, the same teacher supplied him with those notions of the orderly arrangement of society which were afterwards so much the object of his public life. But all these studies had a political end, and the same activity and acuteness which led him into metaphysical inquiries, gave him the will and the power to become ruler of Athens.

In his youth, old men traced a likeness to Pisistratus, which, joined to the obvious advantages with which he would have entered public life, excited distrust, and actually seems to have retarded his appearance on the stage of public life. However, about the year 469, two years after the ostracism of Themistocles, and about the time when Aristides died, Pericles came forward in a public capacity, and before long became head of a party opposed to that of Cimon the son of Miltiades.

Plutarch accuses Pericles of taking the democratic side because Cimon headed that of the nobles. A popular war usually strengthens the hands of the executive, and is therefore unfavourable to public liberty; and the Persian war seems to have been emphatically so to Athens, as at its termination, she found herself under the guidance of a statesman who partook more of the character of the general than of the prime-minister. (Heeren's *Political Antiquities of Greece*.) Cimon's character was in itself a guarantee against aggrandisement either on his own part or others; but we may perhaps give Pericles credit for seeing the danger of so much power in less scrupulous hands than Cimon's. Be this as it may, Pericles took the popular side, and as such became the opponent of Cimon.

About the time when Cimon was prosecuted and fined (before B.C. 461), Pericles began his first attack on the aristocracy through the sides of the Areopagus; and in spite of Cimon, and of an advocate yet more powerful (the poet Æschylus), succeeded in depriving the Areopagus of its judicial power, except in certain inconsiderable cases. This triumph preceded if it did not produce the ostracism of Cimon (B.C. 461). From this time until Cimon's recal, which Mr. Thirlwall places, though doubtfully, in the year 453, we find Pericles acting as a military commander, and by his valour at Tanagra preventing that regret which Cimon's absence would otherwise undoubtedly have created. What caused him to bring about the recal of Cimon is doubtful; perhaps, as Mr. Thirlwall suggests, to strengthen himself against his most virulent opponents by conciliating the more moderate of them, such as their great leader himself.

After the death of Cimon, Thucydides took his place, and for some time stood at the head of the stationary party. He was a better rhetorician than Cimon, in fact more statesman than warrior; but the influence of Pericles was irresistible, and in 444 Thucydides was ostracised, which period we may consider as the turning point of Pericles's power, and after which it was well nigh absolute.

We are unable to trace the exact steps by which Athens rose from the situation of chief among allies to that of mistress over tributaries; but it seems pretty clear that Pericles aided in the change, and increased their contributions nearly one-third. His finishing blow to the independence of the allies was the conquest of Samos and Byzantium, a transaction belonging rather to history than biography; he secured his success by planting colonies in various places, so as to accustom the allies to look on Athens as the capital of a great empire, of which they themselves were component parts, but still possessed no independent existence.

From this time till the beginning of the Peloponnesian war, Pericles appears engaged in peaceful pursuits. He constructed a third wall from Athens to the harbour of the Piræus. He covered the Acropolis with magnificent buildings, and encouraged public taste by the surest of all methods, the accustoming the eye to statuesque and architectural beauty. At Athens, as is usually the case, Poetry had the start of the kindred arts, but during the age of Pericles it attained to a greater height than had ever before been reached. The drama was then at perfection in the hands of Sophocles; and by enabling the poor to attend theatrical representations, Pericles nurtured their taste and increased his own popularity by thus throwing open the theatre to all. This precedent, whether made by Pericles or not, ultimately proved more ruinous to the state than any defeat. It made the people a set of pleasure-takers, with all that restlessness in the pursuit of pleasure which usually belongs to the privileged few. Another innovation, of which Pericles is supposed to have been the author, was equally injurious in its consequences, that, namely, of paying the dicasts in the courts. At first the pay was only moderate, but it operated as a premium on attendance at law suits, the causes became a mode of excitement for a people whose intellectual activity made them particularly eager for anything of the kind, and thence resulted that litigious spirit which is so admirably ridiculed in the 'Wasps' of Aristophanes. But we may well excuse mistakes of this kind, grounded probably on a false view of civil rights and duties, such as an Athenian, with the highest possible sense of the dignity of Athens, would be most likely to fall into. Pericles no doubt had an honest and serious wish to establish such an empire for Athens as should enable her citizens to subsist entirely on the contributions of their dependent allies, and like a class of rulers, to direct and govern the whole of that empire, of which the mere brute force and physical labour were to be supplied by a less noble race.

Pericles was descended, as we have seen, by his mother's side, from the family of Clisthenes, and he was thus implicated, according to the religious notions of those times, in the guilt of the murder of Cylon's partisans, which was committed at the very altars in the Acropolis. (Thucyd., i. 126; Herod., v. 70, &c.) The Lacedæmonians, before the actual commencement of the Peloponnesian war, urged on the Athenians the necessity of banishing the members of the family who had committed this offence against religion, which was only an indirect way of attacking Pericles and driving him into exile. The Athenians retorted by urging the Lacedæmonians to cleanse themselves from the guilt incurred by the death of Pausanias. [PAUSANIAS.]

Pericles lived to direct the Peloponnesian war for two years. His policy was that of uncompromising although cautious resistance, and his great effort was to induce the Athenians to consider Attica in the light merely of a post, to be held or resigned as occasion required, not of hallowed ground, to lose which was to be equivalent to the loss of all. In the speech which he made before war was declared, as it is recorded by Thucydides, he impressed the Athenians with these opinions, representing the superiority of their navy and the importance of avoiding conflicts in the field, which, if successful, could only bring temporary advantage —if the contrary, would be irretrievable.

At the end of the first campaign, Pericles delivered an oration upon those who had fallen in the war, as he had done before at the close of the Samian war. From that speech (at least if Thucydides reported well) we learn what Pericles considered to be the character of a good citizen, and we see in what strong contrast he placed the Spartan to the Athenian method of bringing up members of the state. This speech, the most remarkable of all the compositions of antiquity — the full transfusion of which into a modern language is an impossibility—exhibits a more complete view of the intellectual power and moral character of Pericles than all that the historian and biographer have said of him. The form in which the great orator and statesman has embodied his lofty conceptions, is beauty chastened and elevated by a noble severity. Athens and Athenians are the objects which his ambition seeks to immortalise, and the whole world is the theatre and the witness of her glorious exploits. His philosophy teaches that life is a thing to be enjoyed; death a thing not to be feared.

The plague at Athens soon followed, and its debilitating effects made restraint less irksome to the people; but while it damped their activity, it increased their impatience of war. In spite of another harangue, in which he represented most forcibly how absurd it would be to allow circumstances like a plague to interfere with well-laid plans, he was brought to trial and fined, but his influence returned when the fit was over.

In the third year of the war, having lost his two legitimate sons, his sister, and many of his best friends, by the plague, he fell ill, and after a lingering sickness died. Some beautiful tales are told of his death-bed, all tending to show that the calm foresight and humanity for which he was so remarkable in life, did not desert him in death. It is an interesting question, and one which continually presents itself to a student of history, how far those great men who always appear at important junctures for the assertion of some principle or the carrying out some great national object, are conscious of the work which is appointed for them to do. It would for instance be most instructive, could we now ascertain to what extent Pericles foresaw that approaching contest of principles, a small part only of which he lived to direct. Looking from a distance, we can see a kind of necessity imprinted on his actions, and think we trace their dependence on each other and the manner in which they harmonise. Athens was to be prepared by accessions of power, wealth, and civilization, to maintain a conflict in which, had she been vanquished, the peculiar character of Spartan institutions might have irreparably blighted those germs of civilization, the fruit of which all succeeding generations have enjoyed. But how should this be? Her leader must have been a single person, for energetic unity of purpose was needed, such as no cluster of contemporary or string of successive rulers could have been expected to show. That ruler must have governed according to the laws, for a tyrant would have been expelled by the [illegible] of the Spartans, as so many other tyrants were, or by the [illegible] of the commonalty, every day growing up into greater power. Moreover, without being given to change, he must have been prepared to modify existing institutions so as to suit the altered character of the times. He must have been above his age in matters of religious belief, and yet of so Catholic a temper as to respect prejudices in which he had no share, for otherwise in so intolerant an age he would probably have incurred the fate of Anaxagoras, and destroyed his own political influence without making his country one whit the wiser. He must have been a man of taste; he would not have been able to go along with and direct that artistic skill which arose instantly on the abolition of those old religious notions forbidding any departure from traditional resemblances in the delineation of the features of gods and heroes, otherwise he would have lost one great hold upon the people of Athens. If Pericles had not possessed oratorical skill, he would never have won his way to popularity, and later in life he must have been able to direct an army, or the expedition to Samos might have been fatal to that edifice of power which he had been so long in building. Lastly, had he not lived to strengthen the resolve of the wavering people when the troops of Sparta were yearly ravaging the Thriasian plain, the Peloponnesian war would have been prematurely closed, and that lesson, so strikingly illustrative of the power which a free people can exercise under every kind of fortune, lost to posterity.

Pericles's connection with Aspasia can hardly be passed over without a trifling notice. Some misunderstanding exists on this subject from not taking into account the fact that Aspasia was a foreigner. She came, it is true, as an adventurer to Athens, and it is also probable that she was the cause of the separation of Pericles and his first wife, the widow of Hipponicus. He lived with her after divorcing his wife, who consented to the separation, and he is said to have been strongly attached to her. The relation which subsisted between Pericles and Aspasia may have been of the same nature with the morganatic marriages at present in use on the Continent.* Whether the [illegible]

Pericles, from a bust in the British Museum.

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* At all events it has been attempted to show that the same [illegible] not necessarily imply disgrace, that is, it is not synonymous [illegible] That Aspasia was originally a πόρνη, does not interfere [illegible] the [illegible] having afterwards attained to the relation of an ἑταίρα. It [illegible] that Plutarch himself apologises for the scandal he retails about [illegible] this apology is surely enough to counteract his assertion that [illegible] παιδίσκας ἑταιρούσας τρέφουσα.

of Aristophanes as to the real origin of the Peloponnesian war had any foundation we cannot now tell. It is hardly probable that a man like Pericles should have been a coarse and vulgar voluptuary. [Aspasia.]

(Thucydides; Plutarch, *Pericles*; Thirlwall's *History of Greece*; Clinton's *Fasti Hellenici*.)

PERICRA'NIUM, is the tough fibrous membrane which covers the bones of the skull, and bears the same relation to them which the periosteum does to the bones of the rest of the skeleton. [Bone.]

PERIDOT. [Chrysolite.]

PERIGEE, the point of the moon's orbit in which she is nearest to the earth. [Apogee.]

PE'RIGORD, a province of France, one of those included in the great military government of Guienne. It was bounded on the north by Poitou (a portion of which was prolonged so as to meet the boundary), on the north-east by Limousin, on the south-east by Quercy, on the south by the Agenois, on the west by the Bordelais, and on the north-west by Saintonge and by Angoumois.

Périgord was a compact district extending about 90 miles from north to south and about 70 from east to west, watered by the river Dordogne and its tributaries. It was subdivided into Haut or Upper Périgord, and Bas or Lower Périgord. These provinces were sometimes distinguished as Blanc Périgord and Noir Périgord. In the former were—Périgueux (population in 1831, 8700 town, 8956 whole commune; in 1836, 11,576), capital of all Périgord; Nontron (population in 1831, 2192 town, 3246 whole commune); Ribérac (population in 1831, 3934 commune); Bergerac (population in 1831, 5965 town, 8557 whole commune); Montignac (population in 1831, 2829 town, 3692 whole commune); and other places. In Lower Périgord the towns were, Sarlat (population in 1831, 5317 town, 6036 whole commune; in 1836, 6036 commune), Belvès, St. Cyprien, and others. Périgord is chiefly included in the department of Dordogne.

Périgord gets its name from its capital Périgueux, which has preserved, in an altered form, the name of the Petrocorii, the ancient Gallic inhabitants of the district. It subsequently was subject to the Goths, and then to the Franks, and under the Merovingian dynasty was included in the great duchy of Aquitaine. Under the Carlovingians, Périgord became a county, which came in the tenth century to the counts of Marche.

In consequence of a dispute with the inhabitants of Périgueux, the county of Périgord was declared to be forfeited to the crown, and bestowed on Louis duke of Orléans (A.D. 1399): it afterwards passed by sale to the family of Blois, counts of Penthièvre, and by subsequent changes became part of the inheritance of Henri IV., on whose accession to the throne (A.D. 1589) it reunited to the crown. A branch of the house of the counts of Marche and Périgord became lords of Grignols and princes of Chalais and Talleyrand: the late Prince Talleyrand was a descendant of this stock.

PE'RIGUEUX, a city in France, capital of the department of Dordogne, situated on the Isle, a feeder of the Dordogne, 262 miles in a direct line west-south-west of Paris, or 294 miles by the road from Paris through Orléans and Limoges to Bordeaux. It was known to the Romans by the name of Vesunna, capital of the Petrocorii, a Celtic nation, and, in common with the other Gallic capitals, assumed, near the close of the Roman period, the name of the people to which it belonged, Petrocorii, from which is derived the modern Périgueux. A tower, part of the remains of the ancient town, is still designated Vésone, an evident modification of the original name, and the suburb in which it stands retains the designation of La Cité. This tower is round, about 200 feet in circumference, with a wall 6 feet thick and 65 feet high, composed of square stones, and faced on the inside with a layer of brick and mortar; it has neither doors nor windows, and is supposed to have been built for a temple. There are some few ruins of an amphitheatre, the greater diameter of which is estimated to have been 274 French or nearly 290 English feet, of aqueducts, and of public baths. There are also some remains of the town wall, which now encloses some gardens and vineyards, and show by their construction and materials that they had been hastily rebuilt after some disaster. There is a Roman gate in tolerable preservation, and near the town are the remains of a Roman camp. Périgueux passed from the hands of the Romans into those of the Goths, and subsequently of the Franks. It was at an early period the seat of a bishopric. In the middle ages it was an object of contest to the French and the English (who were then masters of Guienne); in later times it was taken by the prince of Condé in the civil troubles of the minority of Louis XIV., and retaken by the townsmen, who were chiefly of the opposite party.

The town lies chiefly to the left of the road to Bordeaux, which just runs through the outskirts; and to a traveller passing it on that side presents an appearance to which the dark, narrow, crooked streets of the interior do not correspond.

The houses are, however, well built, mostly of freestone, and very lofty; and there are some agreeable public walks. The cathedral of St. Front is a Gothic building, with a tower about 190 feet high: in a chapel of this cathedral is a fine carving in wood of the Annunciation, a work of immense labour and exquisite finish. The office of the prefecture is the finest building in the city. The townhall is in the episcopal palace. The population of Périgueux in 1831 was 8700 for the town, or 8956 for the whole commune; in 1836 it was 11,576. The inhabitants manufacture light woollen goods, hosiery, felt and straw hats, leather gloves, braid, and paper; they carry on trade in corn, wine, grocery, liqueurs, pigs, poultry, game, especially partridges, truffles, which are gathered in the surrounding district, and truffle-pies. Wax-blanching is carried on. There are four yearly fairs. There are a college or high school, with a collection of philosophical instruments attached to it; a library of 16,000 volumes; a museum of natural history and antiquities, a botanic garden, and an agricultural society; also an hospital, a theatre, and public baths.

The diocese of Périgueux comprehends the department of Dordogne; the bishop is a suffragan of the archbishop of Bordeaux. The arrondissement is divided into nine cantons or districts, each under a justice of the peace, and comprehends 116 communes. The population in 1831 was 101,327.

PERIHE'LION, the point of the earth's orbit in which it is nearest to the sun. [Aphelion.]

PERILLUS. [Phalaris.]

PERI'METER, the circuit, or bounding lines, of a plane figure; a term usually applied to rectilinear figures only, but without any particular reason for the restriction.

PERIOD, a name given to the recurring part of a Circulating Decimal.

PERIODIC FUNCTIONS. The general consideration of periodic magnitude, that is, of magnitude which varies in such manner as to go through stated cycles of changes, each cycle being a reiteration of the preceding one, is the subject of Trigonometry. Though that science derives its name from the measurement of triangles (as geometry does from that of the earth), its resources have been cultivated and its methods expanded until no definition short of the preceding will express its object or convey an idea of its powers. In the article cited will therefore be explained the mode of measurement applied to periodic magnitude: the present one is intended for nothing more than to point out a peculiarity of some classes of algebraic functions which has procured for them the name of *periodic* functions.

The calculus of Functions considers only forms, and the operations necessary to convert one given form into another, or to satisfy equations in which some forms of operation are unknown. Periodic functions are those which, performed any given number of times on a variable, reproduce the simple variable itself. Thus $1-x$ and $-x$ are periodic functions of the second order, since

$$1-(1-x)=x, \quad -(-x)=x.$$

Again, $1:(1-x)$ is a periodic function of the third order, since, if we begin with x, and write $1:(1-x)$ for x three times in succession, we end with x also—

$$x, \quad \frac{1}{1-x}, \quad \frac{x-1}{x}, \quad x.$$

Periodic functions are remarkable in the calculus of functions for the simplicity with which questions connected with them can be solved, when compared with the difficulty of solution of cases in which non-periodic functions enter. Their principal properties are here briefly pointed out: for further information, consult Babbage's 'Examples of Functional Equations' (appended to Peacock's 'Examples'), or the article on the Calculus of Functions contained in the 'Encyclopædia Metropolitana,' where further references will be found.

Let ϕx be a function of x; abbreviate $\phi(\phi x)$ into $\phi^2 x$

$\phi(\phi^2 x)$ into $\phi^3 x$, &c.: then, if ϕ be a periodic function of the nth order, $\phi^n x=x$.

Let r be one of the nth ROOTS of unity, then rx is the simplest periodic function of the nth order; but very simple ones of the form $(1+bx):(c-kx)$ may be obtained by making

$$k=\frac{b^2-2bc\cos\theta+c^2}{2(1+\cos\theta)}$$

where θ means the nth part of any multiple of four right angles. For instance, if $n=4$, θ may $=90°$, and $\cos\theta=0$, whence $k=(b^2+c^2):2$; whence

$$\frac{2+2bx}{2c-(b^2+c^2)x}$$

is a periodic function of the fourth order.

Let θx be any function of x whatsoever, and $\theta^{-1}x$ its INVERSE function, so that $\theta\theta^{-1}x=x$; then if ϕx be a periodic function, $\theta\phi\theta^{-1}x$ is also periodic. Thus $1-x$ being periodic of the second order, so are log. $(1-\epsilon^x)$, $\sqrt{(1-x^2)}$, $\sin^{-1}(1-\sin x)$, &c. &c.

Let $\theta\phi\theta^{-1}x$ be called a derivative of ϕx; then if ϕx and ψx be two periodic functions of the nth order, either can in an infinite number of ways be made a derivative of the other. Thus one of the ways in which $1:x$ is a derivative of $-x$ is $\epsilon^{-\log. x}$. Let $1, r, r^2, \ldots. r^{n-1}$, be the n roots of unity, let P_0 be any function of x and y, and let P_1 be the same function of ϕx and ψy, P_2 of $\phi^2 x$ and $\psi^2 y$, &c. From the equation

$$P_0+rP_1+r^2P_2+\ldots.+r^{n-1}\,P_{n-1}=0,$$

find y in terms of x; say $y=\theta x$. Then will $\psi y=\theta\phi x$, or $\psi x=\theta\phi\theta^{-1}x$; that is, ψx is expressed as a derivative of ϕx.

For example, let $\phi x=-x$, $\psi x=1-x$, be the periodic functions, of the second order; then $r=-1$. Let $P_0=ax+by$, then the preceding equation becomes

$$ax+by+(-1)(-ax+b\,\overline{1-y})=0;$$

$$\text{or } y=\theta x=\frac{b-2ax}{2b},\ \theta^{-1}x=\frac{b-2by}{2a}$$

$$\theta\phi\theta^{-1}x=\frac{b-2a\{-(b-2bx):2a\}}{2b}=1-x.$$

The periodic functions, as before observed, are those whose relations are most easily obtained. For example, let αx, βx, γx, be given functions of x, and ϕx an unknown function, to be determined by the equation

$$\phi x=\beta x+\gamma x\,\phi\alpha x.$$

If αx be not periodic, there are two difficulties in the way, each most frequently insuperable: first, the determination of some one solution of this equation; secondly, the determination of the INVARIABLE function of this equation, or the solution of $\psi\alpha x=\psi x$. But when αx is periodic, both difficulties can be overcome and a general solution given. Say $\alpha^n x=x$, then ψx is any symmetrical function of x, αx, $\alpha^2 x, \ldots. \alpha^{n-1}x$; and if $B_0\,B_1$, &c., be βx, $\beta\alpha x$, &c., and $C_0\,C_1$, &c., be γx, $\gamma\alpha x$, &c., the general solution divides into two cases, in the first of which the solution does not depend on the invariable function.

The most general case gives

$$P_0=\frac{B_0+C_0B_1+C_0C_1B_2+\ldots+C_0C_1\ldots C_{n-2}B_{n-1}}{1-C_0C_1C_2\ldots.\,C_{n-1}}$$

In this case the preceding is the most complete and only solution. But if C_0 and B_0, &c., be such that the numerator and denominator of the preceding both vanish, the general solution is

$$n\phi x=\overline{n-1}\,B_0+\overline{n-2}\,C_0B_1+\overline{n-3}\,C_0C_1B_2$$

$$+\ldots.+C_0C_1C_2\ldots C_{n-3}B_{n-2}$$

$$+(1+C_0+C_0C_1+\ldots.+C_0C_1\ldots C_{n-2})\psi x.$$

For demonstration and extension, see the article cited in the 'Encyc. Metrop.,' §§ 192-198, and 235.

PERIODS OF REVOLUTION. In the present article we simply describe the names, commencements, lengths, and uses of those periods which it is most requisite the reader should find distinctly explained in a work of reference, premising some explanation of the way in which comparison of different periods gives new periods.

By a period we mean a definite portion of time, beginning from a given epoch, which being repeated again and again will serve to divide all time subsequent to the epoch (or precedent, if the repetitions be also carried backwards from the epoch) into equal parts, for the purposes of common reckoning and historical chronology. A period is then a fixed portion of time used for measurement, just as a foot or mile is used for measurement of length.

Periods may be divided into natural and artificial; the former immediately suggested by some recurrence of astronomical phenomena; the latter arbitrarily chosen. Since however time cannot be preserved and handed down as if it were material, it is natural that the knowledge of artificial periods should be preserved by representing the number of natural periods which they contain: nor is it to be supposed that artificial periods were ever invented in a perfectly arbitrary manner, or were indeed ever anything more than convenient collections of natural periods.

When one period is contained an exact number of times in another, each recommencement of the larger one is also a recommencement of the smaller one: thus the day being exactly twenty-fours, if any one day begin at the beginning of an hour, all days will do the same. But if the smaller period be not a measure of the larger, a longer period may be imagined, which in this article we will call a *cycle*, consisting of the interval between the two nearest moments at which the smaller and larger periods begin together. Thus a week of seven days and a month of thirty days give a cycle of seven months or thirty weeks, these two periods being equal. If however the two periods can be measured by a larger number of days, the cycle may be made smaller: thus, a month of 30 days and a year of 365 days, or a month of 6 times five days, and a year of 73 times five days, would give a cycle of 6 × 73 times five days, that is of 6 years or 73 months.

When two natural periods are expressed by complicated fractions of days, the method explained in FRACTIONS, CONTINUED, will serve to show nearly how many of one period make up an exact number of the other. Thus the tropical, or common, year being 365·24224 days, and the lunation being 29·53059 days, both approximate, it appears that 36,524,224 lunar months would be 2,953,059 years nearly. To reduce this long cycle to others more convenient for use, and as accurate as the number of figures employed will permit, proceed as in the article cited with the fraction

$$\frac{2{,}953{,}059}{36{,}524{,}224}$$

The quotients obtained are 12, 2, 1, 2, 1, 1, 17, &c. at which we stop, because the appearance of so large a quotient as 17, shows that the result of the preceding quotients is extremely near. The successive approximations derived from the first six quotients are—

$$\frac{1}{12}\qquad\frac{2}{25}\qquad\frac{3}{37}\qquad\frac{8}{99}\qquad\frac{11}{136}\qquad\frac{19}{235}$$

Or 235 lunations make 19 years very nearly.

The period in which all others are expressed is the day, which is not, as many suppose, the simple time of revolution of the earth, but [DAY] the average time between noon and noon. To distinguish it from other days it is called the *mean solar* day.

The year, or the time between two vernal equinoxes, is not a uniform period, nor does the average of one [illegible] period give *precisely* the same as another. [YEAR.] For chronological purposes however it is useless to take account of this variation, and 365·2422414 days, the year of astronomers in our day, may be considered as more than sufficiently exact for any time. In fact the year is made to consist, in the long run, of 365·2425 days, and a cycle of 400 years is necessary to the complete explanation of this fraction. Supposing the years from A.D. 2001 to A.D. 2400, both inclusive, each fourth year is leap-year, beginning with 2004, except only 2100, 2200, and 2300, which gives in the 400 years 365 days to each year, and 97 intercalated days; while adding 97 days to 400 years, adds on the average 97-400ths or ·2425 of a day, to each year. As it is of considerable [illegible] portance distinctly to comprehend an intercalated cycle, that is, one in which fractions are disregarded until they amount to a unit, when they are corrected, to use a common phrase, in the lump, we put down the effect of the correction which is made in this current year (1840), being leap-year. In 1836, immediately after the last intercalation was made, the sun was in the vernal equinox at about 39 minutes after one P.M. on the 20th of March, and the equinoxes then took place as follows:—

1836	Sun in equinox	at 1h 39m P.M.	March 20
1837	„	at 7h 23m P.M.	March 20
1838	„	at 1h 18m A.M.	*March* 21
1839	„	at 7h 1 A.M.	*March* 21
1840	„	at 0h 41m P.M.	March 20

The intercalation of the present year (but for which the sun would have come on the equinox at 41 minutes past noon on the *twenty-first*) has overdone the correction, bringing the equinox nearer to noon than in 1836 by 58 minutes. Now, this over-correction of nearly an hour in four years is set right by leaving out the correction three times in 400 years; a provision, the necessity of which may be imagined, though its exactness cannot be appreciated from the preceding rough calculation.

The Gregorian year, therefore (or the year in the Gregorian reformation of the kalendar), is a portion of a cycle of 400 years of 365 days, 97 of which have an additional day. [KALENDAR.] The Julian year, in use before the Gregorian reformation, is a portion of a cycle of 4 years of 365 days, one of which has an additional day. Without a perfect comprehension of the manner in which the incommensurability of the year and day is remedied, no progress can be made in the understanding of the nature and use of chronological periods.

An Æra means either the commencement of an indefinite reckoning, or of a succession of periods. In the article ÆRA will be found the complete description of the most important æras; but as it often happens that for reference the mere time of an obscure or uncommon æra is wanted without explanation, we subjoin an extensive list, merely giving the leading words, and the date A.D. or B.C. of the vulgar Christian æra. It is to be remembered that the birth of Jesus Christ must have taken place in the fourth year B.C. of this common æra. The figures following the years refer to months and days: thus A.D. 729.6.13 would stand for* the 13th day of June, A.D. 729. We do not mean to say that the events in the following list did take place in the years, far less in the months, or on the days, which are set down: but only that those who used them as æras, took them as having happened in those years, months, and days. Thus the death of Alexander, according to Clinton, took place in B.C. 323, which is most likely to be right; but if those who afterwards made an æra of this death, reckoned from the 12th of November B.C. 324, that day is the æra, whether the event happened then or not.

Mundane æra of Constantinople	B.C. 5508.3.21 (or 4.1)
Civil æra of Constantinople .	B.C. 5508.9.1
Mundane æra of Alexandria	B.C. 5502.8.29
Mundane æra of Antioch .	B.C. 5492.9.1
Commencement of Julian period	B.C. 4713.1.1
Common mundane æra (Abp. Usher) . . .	B.C. 4004
Mundane æra of the Jews .	B.C. 3761 (vernal equinox)
Civil Jewish æra . .	B.C. 3761.10.1
Caliyug (Hindu) . . .	B.C. 3101
Æra of Abraham (Eusebius)	B.C. 2015.10.1
Olympiads . . .	B.C. 776.7.1
Building of Rome (Varro)	B.C. 753.4.21
Building of Rome (Cato)	B.C. 752.4.21
Æra of Nabonassar (Babylonian)	B.C. 747.2.26
Metonic cycle . . .	B.C. 432.7.15
Calippic period . .	B.C. 330
Julian reformation .	B.C. 45
Death of Alexander . .	B.C. 324.11.12
Æra of the Seleucidæ .	B.C. 312.9.1
Æra of Tyre . . .	B.C. 125.10.19
Æra of Vicramiditya (Hindu)	B.C. 57
Cæsarean æra of Antioch { Greeks	B.C. 49
Cæsarean æra of Antioch { Syrians	B.C. 48
Spanish æra . . .	B.C. 38.1.1
Æra of Actium . .	B.C. 30.1.1
First leap-year of the Augustan reformation . . .	A.D. 8
Æra of the Ascension (as used in the Chronicle of Alexandria)	A.D. 38
Æra of Salivahan (Hindu) .	A.D. 77
Æra of Diocletian, or of Martyrs	A.D. 284.9.17
Indiction of Constantinople .	A.D. 312.9.1
Æra of the Armenians .	A.D. 552.7.9
Hegira	A.D. 622.7.16
Æra of Yezdegird . .	A.D. 632.6.16
Gregorian reformation, or new style	A.D. 1582
English adoption of the Gregorian reformation . .	A.D. 1752

Among the various sources of confusion may be noticed —1, an old practice of astronomers who called the year immediately preceding and following the vulgar æra, not 1 but 0; 2, the discrepancies arising from different times of beginning the year. The most important of these to the English reader is the following:—Before the change of style in 1752, and from the fourteenth century to that time, the legal and ecclesiastical year began on the 25th of March, though it was very common in writings, &c., to begin it on the 1st of January. Hence January, February, and twenty-four days of March, were in one year, according to lawyers, &c.; and in another according to others. Thus the Revolution, so called, of 1688, took place in the February of that legal year, or, as we should now say, February, 1689. It is frequently written thus: February, 168$\frac{8}{9}$, or February, 1688-9. Thus, King Charles was beheaded January 30, 164$\frac{8}{9}$, or January 30, 1648-9.

We now come to the artificial periods which are of most use in chronological researches: these are—

1. The cycle of the sun, or more properly the cycle of Sundays.
2. The cycle of the moon, or of nineteen years, or of the Golden number, or of the Primes, or the Metonic cycle with its æra altered. [METON.]
3. The cycle of indictions.
4. The Paschal cycle.
5. The Julian period.

1. The cycle of the sun is a period of 28 years, compounded of 7 and 4, the number of days in a week, and the number of years in the interval of two leap-years. This, *in the old style*, makes the Sundays return to the same days of the year; every year of the cycle being in this respect exactly the same as the same year of the preceding cycle. Thus, the year A.D. 1 being the tenth in its solar cycle, and the DOMINICAL LETTER being for that year B, or the 2nd of January being Sunday, the 2nd of January was also Sunday in the year A.D. (1+28), or A.D. 29, also in A.D. (29+28), or A.D. 57, &c.

The series of dominical letters for the complete solar cycle is as follows:—attached to each dominical letter is what was called the *concurrent* of the year, meaning the number of days elapsed over and above a complete number of weeks, from the beginning of the cycle (not including the first day) to that of the year in question, the concurrent being written 7 where 0 would perhaps have been better.

1	GF	1	8	E	2	15	C	4	22	A	6
2	E	2	9	DC	4	16	B	5	23	G	7
3	D	3	10	B	5	17	AG	7	24	F	1
4	C	4	11	A	6	18	F	1	25	ED	3
5	BA	6	12	G	7	19	E	2	26	C	4
6	G	7	13	FE	2	20	D	3	27	B	5
7	F	1	14	D	3	21	CB	5	28	A	6

Connected with this table is one of what were called solar *regulars* (regulators would have been the modern term), one for each month, as follows:—

Jan.	2	Apr.	1	July	1	Oct.	2
Feb.	5	May	3	Aug.	4	Nov.	5
Mar.	5	June	6	Sept.	7	Dec.	7

The table given in DOMINICAL LETTER would save some of the following process, which however it is better to give.

Old Style.—To find the part of the solar cycle in which any given year is found. If the year be A.D., add 9 and divide by 28; the remainder (or 28 if the remainder be 0) is the year of the solar cycle required. But for a year B.C., deduct 10 from the date, and divide by 28; the remainder deducted from 28 gives the year. The dominical letter and concurrent are then taken from the preceding table. And to find on what day of the week the first day of any month fell, to the concurrent of the year add the regular of the month, the sum (diminished by 7, if it can be done) shows the day, 1 being Sunday, 2 Monday, &c. (But in leap-year one day later must be taken for every month after February.) Thus to find the day on which the æra of the Hegira fell, or July 16, 622 A.D., 622 + 9 or 631 divided by 28 gives the remainder 15, which is the year of the cycle. The concurrent is 4, which added to the regular of July 1, gives 5, or Thursday for the 1st July, and Friday for the 16th; whence Friday is the day required.

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* There is some incorrectness, but great convenience in this. Astronomers now sometimes use such a notation as 1834·61, not to denote 1834 years and 61 100ths of a year, but the moment at which 61-100ths of the 1834th year have elapsed.

The perpetuity of the solar cycle, in the connection of its numbers with the dominical letters, &c., is destroyed by the new style, in which a similar cycle of no less than 2800 years exists. Up to the end of this century however, the cycle of 28 years, as it now exists, will remain undisturbed,* and it may therefore be worth while to give the years of the solar cycle answering to the decads of the century, and the table of dominical letters, concurrents, and regulars:—

1801, 18	1820, 9	1840, 1	1860, 21	1880, 13
1810, 27	1830, 19	1850, 11	1870, 3	1890, 23

	ED	1	8	C	2	15	A	4	22	F	6
2	C	2	9	BA	4	16	G	5	23	E	7
3	B	3	10	G	5	17	FE	7	24	D	1
4	A	4	11	F	6	18	D	1	25	CB	3
5	GF	6	12	E	7	19	C	2	26	A	4
6	E	7	13	DC	2	20	B	3	27	G	5
7	D	1	14	B	3	21	AG	5	28	F	6

Jan.	3	Apr.	2	July	2	Oct.	3
Feb.	6	May	4	Aug.	5	Nov.	6
Mar.	6	June	7	Sept.	1	Dec.	1

To find the first of April, 1836: the year is 25 of the cycle, and leap-year, and the concurrent 3 added to 2, the regular of April, with 1 allowed for leap-year, gives 6, or Friday.

2. The cycle of the moon is that of 19 years, which is very nearly 235 complete lunations, as follows:—the 235 mean lunations of 29·53059 days each make 6939·69 days, while 19 years of 365 days each give 6935 days, and, allowing 4¾ days for leap-years, 6939·75 days. Hence 235 lunations fall short of 19 Julian years by ·06 of a day, or one day in about 317 years. Hence during a period of 300 years, and as far as the mean place of the moon is concerned [EASTER], the new and full moons of the cycle of nineteen years would fall on the same days. On the assumption of 235 lunations exactly corresponding to 19 years, all the rules for finding Easter are founded; and in the steadiness with which this false assumption was held to, lies the value of this cycle in chronology. If the astronomers had been allowed to vary Easter according to the latest improvements in determining the moon's place, the chronology of the details of the different years of the middle ages, confused as it sometimes is, would rarely have been anything but confusion; in chronological reckoning nothing is of any importance compared with keeping to one unvaried rule; and the reformation (so called) of the calendar was, in our opinion, anything but an improvement.

In the article EASTER, the definition of that term is slightly† wrong (page 252). The paschal full moon is that which falls *upon* or next after (not next after only, as stated) the 21st day of March; and Easter Sunday is that which comes *next after* the day of the paschal full moon; so that the earliest possible Easter Sunday takes place when Saturday the 21st of March has a full moon, in which case Easter Day is Sunday the 22nd. Count 29½ days from March 21st (inclusive), beginning at midnight of the 20th, and we come to noon on the 19th of April; if this day be Sunday, the next Sunday is April 26, which it should seem then must be the latest possible Easter Day. But all the tables fix April 25 as the latest Easter Day, and this depends upon the meaning of the words 'full moon' as used by the authorities which settled the time of keeping Easter.

The Jews keep their Passover on that fourteenth day of the moon which follows the vernal equinox. The Nicene council (A.D. 325), believing the equinox to be always on the 21st of March, took that day as their equinox, and the fourteenth day of the moon next following as the guide to the Sunday which should be kept as Easter Day. The provision that if the fourteenth day were Sunday, the next Sunday should be kept, was meant to avoid ever keeping Easter on the same days as the Jews keep their Passover (which was an object of great moment in those days). Now the thirtieth day of the lunation, though partly belonging to the old moon, counts* as the first of the new one. Reckoning thus, we may see that if March 20 be the fourteenth day of the moon, April 18 is the fourteenth of the next moon, and April 2 the extreme limit of Easter Day.

Chronologists have two cycles of nineteen years each, the first of which is the cycle of nineteen years (so called), or the golden number, and the second, which begins three ye later, they call the lunar cycle. These of course only d in their time of commencement, the year 4 of the first cy being always 1 of the second. To show the manner in wh accuracy was attempted to be insured, it is worth while quote the date of one charter, from the 'Art de vérifier Dates,' particularly as all the dates are quite exact:—'A sunt hæc, anno ab incarnatione Domini MCIX., indic II., epacta XVII., concurrente IV., cyclus lunaris V., cy decemnovennalis VIII., regularis paschæ IV., terminus chalis XIIII. kal. Maii, dies paschalis VII. kal. Maii, lu ipsius (diei paschæ) XXI.'

This cycle of 19 years was used with an astronom carelessness which is surprising when it is considered th the due observance of Easter as to time was considered importance in a religious point of view. It is worth wh to describe it, since there are many persons who believe th there was a closer accordance between the paschal full m and that of the heavens than really took place. The A.D. 1 was the second of its cycle, so that by adding 1 to date, and dividing the sum by 19, the remainder gives year of the cycle in question; 19 being the year when remainder is 0.

The finding of Easter according to the old method is a w of prolixity, and the description of it, according to chron gical writers, is puzzling in the extreme. We shall only tempt to describe the result, which in fact amounted, thou it was not seen, to describing both the month and the year not in days, but in periods each a little shorter than day.

Let there be a cycle of 19 years averaging 365·25 days ea and let it be composed of 235 lunations, each of which ther fore must be 29·53 days. Take another period of time, a call it a *short day*, and let 30 short days make the mont 29·53 common days, then the year will consist of 37 short days, say 371 days exactly, or 12 lunations and 11 sh days. Hence the new moons of each year will take 11 short days earlier than in the preceding year. Take period of 30 common days beginning with March 21 a ending with April 19. These will very nearly coincide, ea to each, with 30 short days; and the old method am to confounding these 30 days with 30 short days, and ta the yearly acceleration of the times of full moon at 11 comm days. This may make an astronomical error of half a d and the effect of averaging the years, and treating the l years as common years, a quarter of a day more. To t must be added the continually increasing error ar from neglecting the difference between 19 years and months.

Proceeding as above, let it be supposed that in the year of the cycle there is a full moon on the 5th of Apr supposition which pervades the old method of fin Easter; if then we write down all the days from March to April 19 inclusive in a circle, and putting 1 opposite April 5, write 2 eleven days earlier, or opposite to Ma 25, write 3 eleven days earlier in the *circular* cycle (in w April 19 immediately precedes March 21), or oppos April 13, &c., and then write the dominical letter (wh always the same for the same day of the year) opposi each day of the month,—this will give the table of the style given in EASTER, which is here repeated, and since 18th is the last possible day of a paschal full moon, the days following the 19th may be Easter Sundays, and given with their dominical letters:—

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* Since A.D. 1900 is not leap-year, the whole cycle will then be overthrown, but since A.D. 2000 is leap-year, it may be reconstructed so as to last till 2100.

† The error however is not carried any farther than the first paragraph. But the table in the first column of page 253, for the new style, extends only to A.D. 1900.

* We do not say that this was intended; but it was so in the structure rules nevertheless.

Mar. 21	C	16	Mar. 30	E	7	Apr. 8	G	—	Apr. 17	B	19
22	D	5	31	F	—	9	A	17	18	C	8
23	E	—	Apr. 1	G	15	10	B	6	19	D	—
24	F	13	2	A	4	11	C	—	20	E	
25	G	2	3	B	—	12	D	14	21	F	—
26	A	—	4	C	12	13	E	3	22	G	—
27	B	10	5	D	1	14	F	—	23	A	—
28	C	—	6	E	—	15	G	11	24	B	—
29	D	8	7	F	9	16	A	—	25	C	—

The following then is the mode of finding Easter in (say) A.D. 1237. The year of the solar cycle is 14, thus shown;—

1237
9
———
28)1246(44
Rem. 14. Dom. letter D by table.

The year of the cycle of 19 years is 3, thus shown:—

1237
1
———
19)1238(65
Rem. 3.

Now in the third year of the cycle of nineteen years, by the preceding table, the paschal full moon is on the 13th of April, and the next Sunday letter (D) in the list is opposite to April 19, which is therefore Easter Sunday.

The Gregorian corrections of the method of finding Easter amount to an occasional correction of the place of the paschal full moon in the first year of the cycle of 19 years. Tables which will do perfectly well for a century may be constructed in the same mode as that already described; one is given in the article cited. The following additional explanations may save some trouble to those who try to understand the older writers on chronology.

The epact of the year is usually stated as being the moon's age at the beginning of the year: this is a correct definition as to the epact of the Gregorian calendar, but not so as to that which preceded. The epact of the old calendar is a number depending on the year in such manner that the epact of the year, increased by what was called the lunar regular of any month, gives (with deduction of 29, if necessary) the age of the moon on the first day of that month; so that the age of the moon at the beginning of the year is the epact, together with the regular of January. Thus the epact of every year may be increased or diminished at pleasure, provided all the numbers in the table of regulars be as much diminished or increased; and different tables of epacts will be found in different works, the difference being of course compensated in the regulars, or else in the rule for applying them. The epact of each year of the cycle of 19 years must be 11 more than that of the preceding, abating 30 as fast as it arises; this must be the case in every table, and the most common table of epacts gives 29 as the epact of the first year of the cycle, 10 as that of the second, 21 as that of the third, &c. Corresponding to this, 9 is the regular of January, 10 of February, &c. It is not worth while to give the table, not only because it is now useless, even for old chronology, but because it fails for those years of the decemnovennal cycle in which two full moons come in the same month.

Again, the annual regular, or the regular cited in charters (as in our previous quotation, where it is called the paschal regular), is neither the solar regular described in the former part of this article nor the lunar regular just mentioned, but a third regular belonging to the whole year, and which, added to the concurrent previously described, gave (7 being abated, if necessary) the last day of the moon preceding the paschal moon. Thus A.D. 874, the concurrent being 4 and the annual regular 5, their sum 9 diminished by 7, or 2, gives Monday as the last day of the ante-paschal moon.

The paschal term (terminus paschalis) mentioned in the quotation, meant simply the fourteenth day of the paschal moon.

3. The Indiction was an edict of the Roman emperors, fixing the tribute, and as one such edict was supposed to have appeared every fifteen years, years were naturally reckoned according to their distance from the year of Indiction. There is doubt about the first origin of indictions, about their meaning and their earliest date· all we have here to do with is the fact, that from Athanasius downwards, they were more or less employed by ecclesiastical writers in describing epochs. The popes afterwards adopted this mode of dating, and the common Indiction[*] found in chronological tables begins so that A.D. 313 is the first year of the first cycle of Indiction, each cycle containing 15 years. At this rate A.D. 1 was the fourth year of an imaginary preceding indiction, and the remainder of three more than the date of any year divided by 15 will give its position in its cycle of Indiction. Thus 1239, increased by 3 and divided by 15, gives the remainder 12, or A.D. 1239 is the twelfth year of a cycle of Indiction.

4. The paschal cycle is one compounded of 28 and 19 years, or 532 years, during which time the cycles of the sun and of 19 years run through all their combinations, and recommence them again. According to the old system then, this is the cycle of Easter Days, which begin again in the same order when it is finished. A.D. 1 was the second year of the first paschal cycle, being also 2 of the cycle of 19 years, and 10 of its solar cycle. The paschal cycle of the Gregorian calendar would be 53,200 years.

5. The Julian period was imagined by Julius Scaliger, and is a combination of the solar cycle, the cycle of 19 years, and that of Indictions. Now 28 × 19 × 15 gives 7980 years, which is the length of the period in question. It was made to begin at a year B.C., which was the first year of each cycle, namely B.C. 4713 years. Hence, subtract any year B.C. from 4714, or add any year A.D. to 4713, and you have the year of the Julian period answering to the date used. The advantage (if it be one) of this period is, that by dividing the year in it by 28, 19, and 15, the remainders show the years of the different cycles belonging to the Julian date used, remembering when the remainder is nothing to substitute the divisor instead.

For the history of periods not absolutely used in chronology, see their several names, such as METONIC CYCLE, SAROS, SOTHIAC PERIOD, &c., &c.

Astronomical periods actually existing in nature, may be divided into—*days*, connected with the rotations of planets round their axes—*months*, connected with the rotation of satellites round their primaries—*years*, connected with the rotations of primary planets round the sun—and *secular* periods, connected with slow changes of the elements of orbits. The most convenient period of measurement is the civil or mean solar day at the earth, being the average interval between noon and noon. [SYNODIC REVOLUTION.]

This period being divided into hours, &c., the actual rotation of the earth is $23^h\ 56^m\ 4^s{\cdot}09$, and is called the sidereal day. The average interval between two transits of the moon over the meridian is $24^h\ 50^m\ 28^s{\cdot}32$, which might be called the mean tide-day. The rotation of the moon is the time of her revolution round the earth [MOON]: and the rotations of the planets are as follows (in *sidereal* time, so as to make 24^h the rotation of the earth):—

	h.	m.		h.	m.
Sun	25	12	Mars	24	39½
Mercury	24	5½	Jupiter	9	56
Venus	23	21	Saturn	10	29¼
Earth	24		Uranus unknown.		

Various months are described in the article MOON, the only ones here necessary to cite being the one already used, of $29^d\ 12^h\ 44^m\ 2^s{\cdot}9$, or $29^d{\cdot}53059$, the average interval from new moon to new moon, and $27^d\ 7^h\ 43^m\ 11^s{\cdot}5$, or $27^d{\cdot}32166$, the actual time of revolution of the moon in the heavens. The satellites of Jupiter, Saturn, and Uranus have revolutions round their primaries as follows:—

		d.	h.	m.		d.
Jupiter's	First S.	1	18	28	or	1·7691
	Second S.	3	13	14		3·5518
	Third S.	7	3	43		7·1546
	Fourth S.	16	16	32		16·6888
Saturn's	Ring	0	10	29		0·4370
	First S.	0	22	38		0·9427
	Second S.	1	8	53		1·3702
	Third S.	1	21	18		1·8878
	Fourth S.	2	17	45		2·7395
	Fifth S.	4	12	25		4·5175
	Sixth S.	15	22	41		15·9453
	Seventh S.	79	7	55		79 3296

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[*] The first indiction of Constantine is variously stated to have been A.D. 312, 313, 314, and 315.

		d.	h.	m.	d.
Uranus's	First S.	5	21	25	5·8926
	Second S.	8	16	58	8·7068
	Third S.	10	23	4	10·9611
	Fourth S.	13	10	56	13·4559
	Fifth S.	38	1	48	38·0750
	Sixth S.	107	16	40	107·6944

The civil year is the *tropical* year, or the time of revolution of the sun from the vernal equinox to the same again. Owing to the motion of the equinox [PRECESSION], this year, or 365^{d} 5^{h} 48^{m} 49^{s}·7, or 365^{d}·2422414, is shorter than the actual revolution of the earth round the sun, which is 365^{d} 6^{h} 9^{m} 9^{s}·6, or 365^{d}·2563612. Again, the *anomalistic* year, being that in which the earth moves from its nearest point to the sun to the same again, is 365^{d} 6^{h} 13^{m} 49^{s}·3, or 365^{d}·2595981. The following is the list of the actual revolutions of the planets round the sun, each to a tenth of a day, including the verified periodic comets, as far as their times are known:—

	Days.		Days.
Mercury .	88·0	Ceres .	1681·4
Venus .	224·7	Pallas .	1686·5
Earth .	365·3	Biela's Comet	2460·0
Mars .	687·0	Jupiter .	4332·6
Encke's Comet	1210·0	Saturn .	10759·2
Vesta	1325·7	Uranus	30686·8
Juno	1592·7	Halley's Comet	75 to 76 years.

Of secular periods, the most important are, the revolution of the moon's node, in 18·6 years; of the earth's perihelion, from the vernal equinox to the vernal equinox again (the latter also moving), or 21,000 years; and the revolution of the equinoxes themselves, in 26,000 years.

PERIŒCI (περίοικοι), an old astronomical term for those who have the same latitude, but opposite longitudes.

PERIO'STEUM. [BONE.]

PERIO'STRACUM, Mr. Gray's name for the *epidermis* of shells. [SHELL.]

PERIPATETICS (περιπατητικοί) is the name given to an antient philosophical sect. It was so designated from the circumstance of its founder, Aristotle, being accustomed to deliver his doctrines while walking in the grove of the Lyceum in the suburbs of Athens. (For an account of the life and works of this philosopher, see ARISTOTLE.) There is scarcely any department of human knowledge of which the writings of Aristotle do not treat. It would far exceed the limits of this article to give a full detail of his opinions. Such of them only as characterised the school which he originated can be referred to, and even these must be briefly noticed. They have relation chiefly to his general physical and metaphysical principles. To his system of logic, with the additions subsequently made to it by his disciples, it is unnecessary particularly to advert. [ORGANON.]

From the obscurity which attaches to the writings of Aristotle, occasioned by the errors which have crept into them, the abstruseness of the topics which he discusses, and the brevity and conciseness of his style, it is somewhat difficult to ascertain with precision what his opinions really were. Previous to his time it was commonly supposed by those who had speculated respecting the origin of the universe, that there is an eternal substance from which bodies are made, and on which forms are impressed, and to which the name of matter was assigned. This matter was understood to have been always in motion, to consist of indefinitely small particles, and to have been collected and united in bodies by the agency of an intelligent principle. It was further supposed that the original particles had certain properties by which they differed from each other, and by which the constitution of the bodies which they composed was determined. Empedocles and others taught that there are four primary elements, which are the bases of all corporeal forms; Anaxagoras and his followers maintained that bodies exactly represent the form of each of their constituent particles; while Plato held that essential forms have an actual existence in the divinity, and that by the union of these with matter the formation of bodies is effected.

Rejecting all these theories, Aristotle assumed the underived and independent existence of two opposite principles. But since such principles by their contrariety would destroy each other, the existence of a third was requisite. These he conceived to be matter, form, and privation, the first two being the constituent principles of things, and the last being accidentally connected with them. The first matter was imagined to be entirely destitute of all qualities, to exist potentially, and to be the subject in which forms are made to inhere. Form he explained to be the essence of a thing, or that which constitutes it what it is. How the first matter and form were brought into union so as to produce bodies does not appear; unless nature, the meaning of which term, as employed by Aristotle, it is not easy to apprehend, accomplishes the union.

Aristotle distinguished causes into the material, the formal, the efficient, and the final; the first being that of which things are made, the second that by which they are what they are, the third that by the agency of which anything is produced, and the last the design of its production. Having thus provided for the existence of substances generally, Aristotle divides them into three classes: the eternal, as the heavens; the perishable, as the bodies of animals; and the immutable nature, or prime mover, as it was otherwise called. This prime mover, which occupies the place of God in his system, was considered to be an eternal, incorporeal, and simple intelligence, and the original source of all motion, being itself unmoved. Its agency extended directly to the first celestial sphere, and mediately through similar inferior intelligences to the lower spheres, and by them to the universe at large. The mode in which it operated to the production of motion seems to have resembled that by which the volitions of the human soul give rise to muscular action.

Sensible bodies were divided by Aristotle into simple and compound; simple bodies being those elements which result from the combination of primary matter and form, and compound bodies those which proceed from elementary combinations. In bodies thus distinguished there are certain active and passive qualities, which constitute their specific difference, and by which they mutually tend to transform each other into their own nature. In consequence of the action of the first mover, whether direct or indirect, on matter there is a continual succession of dissolution and reproduction; reproduction taking place when the essence of a body is entirely changed, and only an augmentation or diminution when its accidental qualities undergo mutation.

Such is an imperfect sketch of Aristotle's general doctrine of physics. His opinions respecting man may be shortly summed up. The principles of the soul and of animal he thought to be identical, giving them the common denomination of entelecheia (ἐντελέχεια), or perfect energy. The faculties of the soul he considered to be, the nutritive, by which life is produced and preserved; the sensitive, by which we perceive and feel; and the rational, by which we understand. The sensitive faculty takes cognizance of external objects by means of its organs, which are adapted to produce the various sensations of sight, hearing, &c. The senses receive forms or sensible species in the same manner as wax receives the impression of a seal. Fancy is the perception which results from the immediate operation of the senses; while memory is derived from fancy, and is the effect of images formed in the soul by the senses. The intellectual or rational faculty is of two kinds, either active or passive. Passive intellect receives the form of things, and is the seat of species. Active intellect is either simple or complex: simple when it engages in the close apprehension of its object; complex when it combines simple conceptions so as to engender belief. Intellectual action is theoretic when it contemplates what is simply true or false, and practical when it determines what is good or evil, and thus gives rise to volitions.

Whether Aristotle believed in the immortality of the soul or not, has not been clearly ascertained. From his notion that the soul is a power externally transmitted unto the body, it has been inferred that he held it to be mortal, and that it ceased to have a separate existence after the dissolution of the body.

Aristotle's school in the Lyceum was continued for about twelve years. In consequence of the hostility of his enemies, who accused him of propagating impious tenets, he retired, soon after the death of Alexander, to Chalcis, where he died. Before withdrawing from his public labours however he appointed Theophrastus, of Eresus in Lesbos, as his successor in the chair. The opinions of Theophrastus differed in some respects from those of Aristotle, but he taught with great success, and was attended by about two thousand scholars. He was followed consecutively by Strato of Lampsacus, Lycon, or Glycon of Troas, Ariston of Ceos, and Critolaus the Lycian. With Diodorus of Tyre, who came immediately after Critolaus, the uninterrupted succession of the Peripatetic school terminated, about the hundred and fiftieth olympiad. Among the early followers of the Stagirite, who did not fill the chair, were several eminent philosophers. The most distinguished of these were Dicaearchus, a Messenian, Eudemus of Rhodes, and Demetrius Phalereus.

The Peripatetic doctrines were introduced into Rome in common with the other branches of the Greek philosophy by the embassy of Critolaus, Carneades, and Diogenes, but were little known till the time of Sylla. Tyrannion, an eminent grammarian, and Andronicus Rhodius, were the first who brought the writings of Aristotle and Theophrastus into notice. The obscurity of Aristotle's writings tended much to hinder the success of his philosophy, but it nevertheless soon gained a considerable number of supporters. During the reign of the Caesars, it acquired all its ancient influence; and till the time of Ammonius, the preceptor of Plutarch, was taught with great purity. After that it was divided into two sects, consisting respectively of those who wished to adhere strictly to Aristotle, and those who were disposed to amalgamate his doctrines with those of other schools. Julius Caesar and Augustus patronised the Peripatetic philosophy. Under Tiberius, Caligula, and Claudius, its adherents, in common with those of other sects, were either banished or obliged to remain silent on the subject of their peculiar tenets. This was the case also during the greater part of the reign of Nero, although during the early part of it philosophy was favoured. The chief Peripatetics in the first century of the Roman empire were Sosigenes of Egypt, who wrote a commentary on Aristotle's treatise *De Coelo*, Boethus of Sidon, who is mentioned by Strabo as having been his fellow-student in the Aristotelian philosophy, and Nicolaus of Damascus in Syria.

Ammonius the Peripatetic made great exertions to extend the authority of Aristotle; but about his time the Platonists began to study his writings, and prepared the way for the establishment of the Eclectic Peripatetics under Ammonius Saccas, who flourished about a century subsequent to Ammonius the Peripatetic. Even after this period however some were still found who adhered exclusively to Aristotle. The most celebrated of these was Alexander of Aphrodisias, who was a public professor of the Peripatetic philosophy, under Septimius Severus, in Alexandria or in Athens. Many of the Eclectic Aristotelians wrote commentaries on his works, some of which are still extant. The principal of these writers were Themistius, who flourished during the reigns of Constantius and Theodosius the Great; Olympiodorus, who lived about a century later; and Simplicius Cilix, in the time of the emperor Justinian.

After this period, philosophy in general languished. But in that mixture of ancient opinions with theological dogmas which constituted the philosophy of the middle age, the system of Aristotle undoubtedly predominated. About the twelfth century it had many adherents among the Saracens and Jews, particularly in Spain; and at the same period also it began to be diligently studied, though not without much opposition, among the ecclesiastics of the Christian church. Out of this latter circumstance gradually arose the Scholastic philosophy, which took its tone and complexion from the writings of Aristotle, and which continued long to perplex the minds of men with its frivolous though subtile speculations. The authority of Aristotle received a severe shock at the Reformation, but it survived the fall of the Scholastic system. His opinions were patronised by the Roman Catholic church, on account of their supposed favourable bearing on certain doctrines of faith; and although Luther and others of the Reformers determinedly opposed them, they were maintained by such men as Melancthon, who himself commented on certain portions of the works of the Stagirite. Many individuals distinguished for their genius and learning exerted themselves to revive the Peripatetic philosophy in its primitive purity, nor did it cease to have numerous illustrious supporters until the time of Bacon, Grotius, and Des Cartes. (Aristot., *Phys.*, *De Coelo*, *De Gen. et Corr.*, *De Anima*; Diog. Laertius; Fabric., *Bibl. Graec.*; Cudworth's *Intell. Syst.*; Brucker, *Hist. Crit. Phil.*)

PERIPHERY, the Greek word for circumference; a term applied both to rectilinear and curvilinear figures.

PERIPNEUMONY. [LUNGS, DISEASES OF.]

PERIPTERAL, or **PERIPTEROS.** [TEMPLE.]

PERISCII (whose shadows move round). In those latitudes which are high enough to have the sun for twenty-four hours together, the shadows make complete revolutions, whence the inhabitants may be called Periscii (Περίσκιοι).

PERISTERA. [COLUMBIDAE, vol. vii., p. 375.]

PERISTERINAE. [COLUMBIDAE, vol. vii., p. 374.]

PERISTO'MIANS, Lamarck's name for a family of fluviatile operculated Trachelipods (Gastropods of Cuvier and naturalists), breathing water, consisting of the genera *Valvata*, *Paludina*, and *Ampullaria*.

M. Deshayes (*last edit. of Lamarck*) observes that though founded on natural characters, the family of *Peristomians* has not been adopted by the majority of authors. Cuvier, he remarks in continuation, referred *Valvata* and *Paludina*, in the first edition of the 'Règne Animal,' to his great genus *Turbo*; and though he recognised the analogy of the *Ampullariae* with the *Paludinae*, he did not the less place them in his genus *Conchylium*[*] near the *Phasianellae*. M. Deshayes thus continues:—'De Férussac, so often an imitator of Cuvier in the classification of shells, has imitated him here; and M. de Blainville himself, resting on anatomical observations, differs but little, in his 'Treatise on Malacology,' from the opinion of the latter. Nevertheless if we turn to what M. de Blainville says on the subject of the *Ampullariae* and the *Paludinae* in the 'Dictionnaire des Sciences Naturelles,' we shall there find his opinions opposed to his classification. M. de Blainville in fact, who had made a dissection of *Ampullaria*, finds the greatest analogy between the animals of this genus and those of *Paludina*. If then classifications are intended to approximate forms which resemble each other, why place the *Ampullariae* and the *Paludinae* in two distinct families?[†]

'In the second edition of the 'Règne Animal,' Cuvier has more nearly approximated the three genera of the family of the *Peristomians*, comprehending all three in his *Trochoid Pectinibranchians*. Since the anatomical work on the *Ampullariae*, by M. de Blainville, M. Quoy, in the zoology of the 'Voyage of the Astrolabe,' has given his observations on a large species, and we can now compare the organization of the *Ampullariae* with that of the *Paludinae*, on whose anatomy Cuvier published a memoir.'

M. Deshayes then goes on to state that he has himself been able to add to the observations already known some interesting facts on the organization of the *Ampullariae*. If, says he, we consider the shells and the opercula which close them, we find an indisputable analogy between them, an analogy so great in some species that one even doubts to which of the two genera they ought to belong. The affinities (rapports) of the *Ampullariae* and *Paludinae* are then, in the opinion of M. Deshayes, incontestably established; and these affinities, he adds, are so numerous, that it seems impossible to him to separate the genera. The *Valvatae* have also, he thinks, very great affinities with the *Paludinae*, from which they are nevertheless distinguished by the manner in which the animal carries its *branchiae*.

If, says M. Deshayes, in concluding his observations on this family, the additions with which science has been enriched since the works of Lamarck, have confirmed his family of Peristomians, it remains to be ascertained whether the family itself should not change its situation. It is evident that the genera which it contains closely approach those of the family of the Turbos; it would therefore be proper to place the *Peristomians* in the neighbourhood of the *Turbinaceans*, and to arrange them near the family of the *Neritaceans*, which has certainly less direct affinities with the Turbo family. It may be perceived that in a linear classification like that which must necessarily be followed in a work, it is impossible to express exactly the affinities, sometimes complicated, of the families of the same great group. To set forth these affinities, we know, says M. Deshayes, but one method, that of a classification with lateral or parallel branches; and it is particularly in the group of *Pectinibranchiata*, where the genera and species are so numerous, and the shell has the aperture entire, that the necessity of a better arrangement forces itself on the attention.

M. Rang, in his 'Manuel,' places *Paludina* at the head of the genera forming the *Turbines* of Férussac, the first family of the *Pectinibranchiata*. *Valvata* is also arranged in the same family between *Magilus* and *Natica*. *Ampullaria* is placed in the second family (the *Trochoides* of Cuvier), between *Nerita* and *Janthina*.

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[*] In Cuvier's last edition of the 'Règne Animal,' the genus Conchylium is discarded, and then *Valvata* [illegible], and *Paludina* is placed between *Valvata* and *Littorina*. *Ampullaria* is placed next to *Phasianella*, and is followed by *Helicina*. These are all arranged under his family of *Trochoides*.

[†] In M. de Blainville's 'Manuel de la Malacologie,' *Ampullaria* is placed in the family of *Ellipsostomes*, between *Phasianella* and *Helicina*. *Valvata* and *Paludina* are arranged in the family of *Trochoides*; the first of the last named genera between [illegible] and *Cyclostoma*, and *Paludina*, which terminates the *Trochoides*, immediately after *Cyclostoma*. The *Ellipsostomes* immediately succeed the *Trochoides*.

The late Rev. Lansdown Guilding makes his family *Ampullariadæ* consist of the genera *Paludina*, *Pachystoma*, *Ampullaria*, and *Ceratodes*.

Mr. Swainson, in his newly published treatise on 'Malacology' (*Cabinet Cyclopædia*, 1840), reduces the *Ampullarinæ* to a subfamily of the *Turbidæ*, and this subfamily comprehends the following genera and subgenera: *Valvata*, *Ampullaria* (with the subgenera *Pachylabra*,* *Lanites* (Lanistes), and *Ceratodes*), *Paludina* (with the subgenera *Paludina* and *Nematura*), and *Meladomus*. The *Ampullarinæ* are immediately succeeded by the *Melanianæ*.

Valvata. (Muller.)

Generic Character.—*Animal* with a very distinct head prolonged into a sort of widened proboscis; tentacles very long, subcylindrical, slightly curving outwards, very much approximated at the base, pointed at the extremity; eyes sessile at the posterior side of their base; foot bilobate anteriorly; branchiæ long, pectiniform, more or less capable of being exserted out of the cavity, which is largely open, and provided at the right of its inferior edge with a long appendage simulating a third tentacle; male organ retiring within the respiratory cavity.

Shell discoid or conoid, umbilicated, the whorls rounded and distinct, the apex mammillated; aperture round or nearly round, its borders united and trenchant.

Operculum horny, round; its elements concentric and circular.

Mr. Swainson is disposed to regard *Valvata* as a subgenus of *Paludina*.

Valvata piscinalis, with its shell, creeping.
a, natural size; *b*, enlarged.

Geographical Distribution of the Genus.—This genus appears to have been found as yet in Europe and North America only. M. Deshayes, in his Tables, makes the number of living species four, and names *Valvata piscinalis* as the only species living and fossil (tertiary). In his last edition of Lamarck the number of recent species recorded is six.

Example, *Valvata piscinalis*.

Description.—Shell conoid, globose, subtrochiform, umbilicated, white; whorls four or five; apex of the spine obtuse.

Locality, &c.—This little shell, which has four complete whorls, without including the apex, inhabits rivulets and ponds in England and France, and is, in all probability, to be found in Europe generally.

Valvata piscinalis.
a, shell, natural size; *b*, *c*, magnified; *d*, operculum enlarged; *e*, glutinous masses of eggs on a leaf; *f*, mass of eggs enlarged.

Paludina. (Lam.)

Generic Character.—*Animal* furnished with a proboscidiform head; mouth toothless, but containing a small lingual bristly mass; tentacles conic, elongated, contractile; eyes at the external base of the tentacles; foot oval, with a marginal furrow at its anterior part; male organ very large, swelling up the right tentacle, whence it comes forth from an orifice situated near its base; anus at the extremity of a small tube in the flooring (plancher) of the respiratory cavity

Shell furnished with an epidermis, conoid, having the whorls of the spide rounded, and the apex mamma[illegible]; aperture rounded, oval, angular at the summit, the [illegible] united and trenchant.

Operculum horny, its elements concentric, with its [illegible] excentric

Paludina parvula, animal and shell magnified.
a, side view; *b*, seen from above. (Guilding.)

Lamarck states that the *Paludinæ*, many species of which have been confounded with the *Cyclostomata*, *Bulimi*, and *Turbines*, inhabit fresh waters almost generally, but some live also in brackish and even in quite salt waters. They breathe water only, like the *Valvatæ*, with which they have a great affinity; but their branchiæ are internal, and they are further distinguished from that genus by the form of the aperture, which is rather longer than it is wide, being modified by the last whorl, which presents an angle at its summit. Their habits he describes as being very nearly those of the *Lymneæ*, like which the *Paludinæ* may be often seen progressing at the surface of the water, foot uppermost.

M. Deshayes, in the last edition of Lamarck, remarks that Linnæus knew the most common species of *Paludina*, and referred it to his indigested genus of *Helices*, under the name of *Helix vivipara*. Müller withdrew the form from the genus *Helix*, and, believing that he saw sufficient affinities between it and the *Nerits*, united both genera under the latter name. Lamarck rectified the errors of former zoologists, gave the genus its proper place, and characterized it clearly; in this he was aided by the anatomical researches which Cuvier bestowed upon the large species of *Paludina* belonging to our fresh waters. M. Deshayes goes on to serve that the shells of the *Paludinæ* are generally delicate, oval-globose, rarely elongated, and subturriculate; the aperture, with a complete peristome, is always modified by the penultimate whorl, and terminates posteriorly by a more or less sharp angle. If a *Paludina* be placed perpendicularly it will soon be perceived that the plane of the aperture is entirely parallel to that of the longitudinal axis. A horny operculum, generally delicate, sometimes thicker and [illegible] calcareous, closes the shell exactly, and is very distinct from that of the *Turbines* and *Cyclostomata*; it differs also from that of the *Littorinæ*.

This operculum is not formed spirally; the summit is subcentral, and its growth is effected by laminæ superadded to its circumference.

Geographical Distribution of the Genus.—This form is widely spread. Species have been found in Europe, Asia, Africa, and America. The European species are the habitants of temperate climates. M. Deshayes observes that the greatest number of the species live in fresh waters, and that they are met with in a great number of various localities on the earth's surface. They appear nevertheless to be more common in the northern than in the southern hemisphere; but perhaps, as M. Deshayes remarks, the difference may be attributed to the state of observation. Some small species, he adds, live in brackish waters, where they are found in great abundance.

The number of recent species of *Paludinæ* given in the Tables of M. Deshayes is twenty-five, and of these *Paludinæ Achatina*, *unicolor*, and *impura* (*tentaculata*), are noted as living and fossil (tertiary). In the last edition of Lamarck, the number is twenty-one only, but this is below the mark, *Paludinæ Genicula* and *Magnifica*, *Conrad*, are, for instance, omitted.*

Example, *Paludina vivipara*

Description.—Shell ventricose-conoid, thin, diaphanous, very delicately striated longitudinally, greenish brown, [illegible] brown and obsolete transverse bands; five turgidly-rounded whorls, the suture strongly marked.

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* This is substituted by Mr. Swainson for *Pachystoma* of Guilding, on the ground that the name has been already used in Ichthyology, but *Pachylabra* is a hybrid word, derived from Greek and Latin roots. '*Pachycheilus*' would be free from the last objection.

* Mr. Lea, of Philadelphia, who has added so much to our [illegible] branch of natural history, has published and figured collectively the [illegible] species (May 1, 1838):—*Paludina* [illegible], *hyalina*, [illegible], [illegible], *pallida*, and *Nicklinsiana*.

Locality, &c.—Fresh waters, rivers, and ponds of England, France, Germany, &c.

Paludina vivipara. (Female.)

a, Shell of an adult, with young [illegible]; b, operculum; c, young shell [illegible].

The genus *Nematura*, Benson, arranged by Mr. Swainson as a subgenus of *Paludina*, is thus characterised.

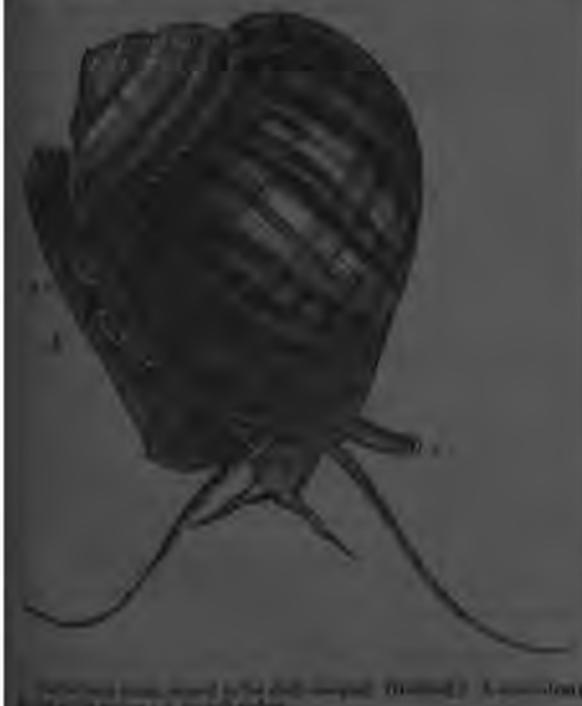
Shell thin, nearly oval, somewhat compressed from back to front; whorls few and rounded, spire acute, last whorl largest but contracted near the aperture; aperture small, oblique, rounded anteriorly; peristome continuous and thin; operculum spiral, horny, and with few volutions. Mr. Benson has described two recent and one fossil species, all these very minute, in the *Magazine of Natural History*, new series.

Ampullaria. (Lamarck.)

Generic Character.—*Animal* globular or planorbiform; *foot* large, delicate, and subquadrangular, largely truncated anteriorly. *Head* flattened, terminated anteriorly by a pair of conical buccal tentacula; two great subulate *tentacula* nearly as long as the foot, supporting at their base oculiferous peduncles, sometimes separated throughout their length. No jaws, but a lingual bristled ribbon. *A respiratory canal* formed by the mantle, but not leaving any trace on the shell. *Branchial cavity* of great size, largely open anteriorly, and whose upper wall is doubled so as to form a great aquiferous sac. (Deshayes, principally.)

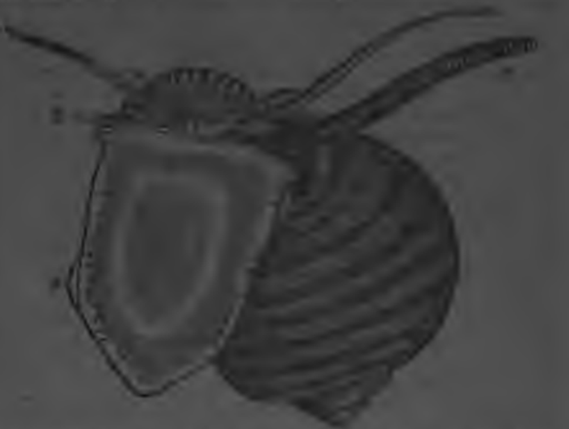
Shell furnished with an epidermis, generally not stout, but globular, ventricose, and umbilicated; spire very short, the last whorl much larger than all the others put together; aperture oval, rather longer than it is wide, borders united, the right lip trenchant.*

Operculum horny or shelly, rarely calcareous, rather delicate, composed of concentric elements, the apex submarginal and inferior.

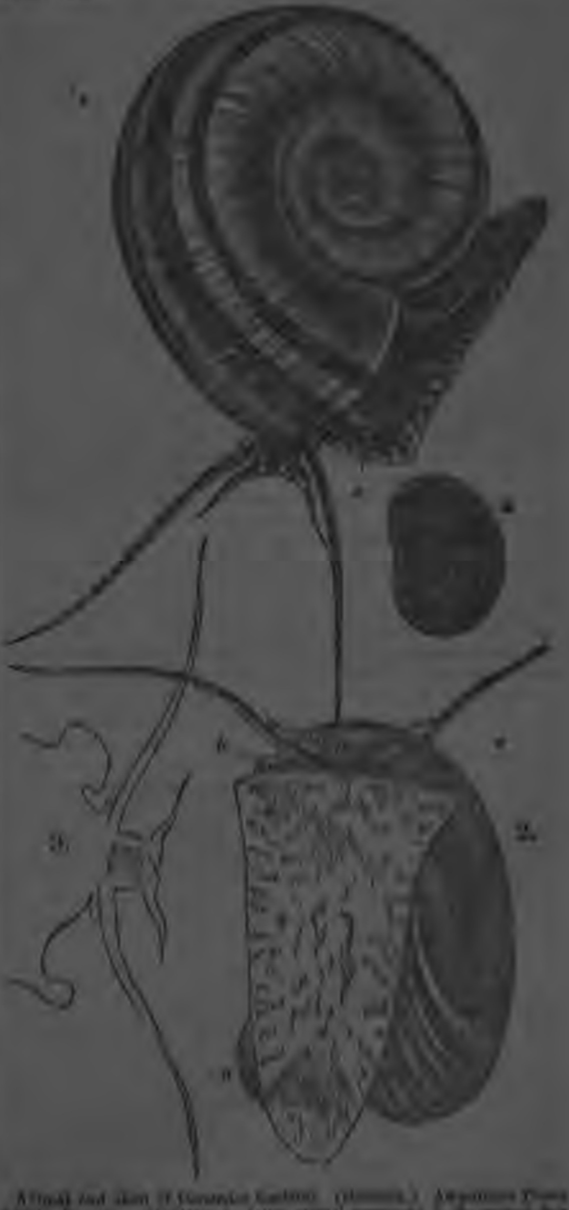


Ampullaria [illegible] (Quoy and Gaimard.) 1, operculum; [illegible]; b, the left siphon.

M. Deshayes (*last edition of Lamarck*), observes that all the operculated fluviatile shells were arranged by Müller in his genus *Nerita*. Linnæus confounded some of them with the *Helices*, and under these two generic denominations



Ampullaria [illegible] the upper side of the foot, &c. (Quoy and Gaimard.) The animal is represented as [illegible] to the surface of the water to breathe, and with the respiratory siphon expanded. a, the operculum; b, the right siphon; c, the left siphon.



Animal and shell of Ampullaria [illegible] (Lamarck.) Ampullaria [illegible] Africa, Senegal. (Adanson.) 1, the animal creeping; 2, the animal in a [illegible] position; a, operculum; b, the right siphon; c, the [illegible]; 3, head, tentacula, eyes at their base [illegible].

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* In some species, it is [illegible].

were then indicated the small number of *Ampullariæ* known to those authors. Bruguière afterwards removed the species into his genus Bulimus, and Lamarck then established the genus under the name which it at present bears, without however any knowledge of the animal, and the absence of this information led him to comprehend under his genus many fossil species which have not its characters. ‘At present,’ continues M. Deshayes, ‘when the animal is known, and in consequence of the peculiarity of its organization many have been brought alive into Europe, we have presented to us the means of completing the characters of the genus and of rendering it more natural by the rejection of all the species which do not include all the characters, or in adding those which have been distributed among other genera. Thus it is, as we have already had occasion to observe, that the *Planorbis Cornu Arietis*, provided with an operculum, and the animal of which has been figured, belongs, in reality, to the genus *Ampullaria*. We are at a loss therefore for the motive which could determine Mr. Guilding to form the genus *Ceratodes* on this shell, when he had the opportunity of comparing the animal with that of *Ampullaria globosa*, animals in which it is impossible, judging from the figures which Mr. Guilding himself has given, to perceive generic differences.’

Before we follow M. Deshayes, as we presently shall, into an inquiry with regard to the organization of this remarkable genus, it becomes necessary to advert to the acuteness of Mr. G. B. Sowerby, who first pointed out, with all due deference to Lamarck, the true place of the *Planorbis Cornu Arietis* of that zoologist, and placed it among the *Ampullariæ*, in its true position. (*Genera*, No. 4.) For this he was sharply censured by Mr. Swainson, in his interesting *Zoological Illustrations* (title ‘Ampullaria Globosa,’ pl. 119). Specimens however soon came to hand with the operculum, thus destroying the principal ground of Mr. Swainson's severe criticism, and the knowledge of the animal soon extinguished all doubts as to the propriety of Mr. G. B. Sowerby's opinion. (See further, LIMNEANS (Planorbis), vol. xiii., p. 499.) We deem it necessary to call the attention of the student to this, that he may not be misled by the observations of a zoologist so justly distinguished as Mr. Swainson; indeed, he himself, by the position which he has assigned to *Ceratodes* in his lately published treatise on ‘Malacology,’ * virtually negatives his former judgment.

Ampullariæ have been, as has been before hinted, brought to Europe alive. The first, we believe, was sent to Paris by M. Caillaud from the Nile. That naturalist, during his voyage to Meröe, collected several Egyptian Mollusca, which he distributed generously among collectors. One correspondent had been anxious for the fluviatile mollusks found in the Nile. The person employed to collect these, after having gathered a large quantity of river mollusca, among which were some living *Ampullariæ*, put them all into a box of bran (son). This box was delayed on its road by the operation of the quarantine laws for four months, and when it reached M. Caillaud, was in such a state, from the putrefaction of the greater part of its animal contents, that he hastened to throw the whole into the water. To his no small surprise he found, a few hours after, the greater part of the *Ampullariæ*, which had been shut up with this mass of putrefaction, quietly creeping about upon the mud. He gave many individuals to M. Deshayes, who kept them alive from four to five months. The latter zoologist remarks that, since that communication, Mr. Sowerby, in the *Zoological Journal*, and M. Quoy, in the *Zoology* of the Astrolabe, have given the figures of many other species of *Ampullariæ*, many of which have been brought alive to Europe. We know of no other figures of *Ampullariæ* in the ‘Zoological Journal’ than those illustrative of the Rev. Lansdown Guilding's paper above copied.

On the 29th of October, 1833, Mr. Cuming, so well known for the great additions which he has contributed to our knowledge of the Mollusca by his collections from the west, and who is now employed in the same laudable pursuit in the east, brought to Mr. Broderip a specimen of *Ampullaria globosa*, expressing his opinion that it might be alive. Mr. Broderip immediately placed the specimen in a deep dish with some earth at the bottom, which was covered with New River water, and set it before the fire. On the 29th the animal gave no sign; but on the 30th it came forth and soon showed tokens of vigorous life. It was afterwards removed into a globular glass vase, such as is used for gold and silver fish, with a good layer of earth at the bottom. The water and earth were changed periodically, and the animal continued to live in apparently good health for many weeks. Its death was probably occasioned by the difficulty of resisting the low temperature of the long cold winter nights, where there were no stoves, in short nothing beyond the ordinary fires of a dwelling-house. The specimen is now in the museum of the Royal College of Surgeons.

M. Deshayes proceeds to observe that it became an object of inquiry how aquatic animals, unable to respire, except by means of a pectinated branchia, could remain alive so long out of the element apparently necessary to their existence. Nearly all the persons, he remarks, who occupied themselves with this phenomenon, thought that the animal retiring into its shell carried with it a certain quantity of water, which could not escape owing to the retention of the operculum, which closes the aperture with great exactness. Others thought that the humid air carried upon the branchiæ was sufficient to keep up the respiratory action. ‘Wishing to know,’ continues M. Deshayes, ‘whether there were anything in the structure of the animal which could explain the singularity, we soon perceived that the upper wall of the branchial cavity was doubled, and formed a great pouch, the aperture of which was placed backwards, above the origin of the branchiæ. Plunged in the water, the animal has this pouch constantly filled with the ambient liquid, and on retiring into its shell and shutting itself up under its operculum, this bag still remains filled with water, and this furnishes the necessary materials for the function of respiration. Everything leads us to believe that this is the cause which permits the *Ampullariæ*, pectinibranchiate aquatic animals, to remain a long time out of the water without perishing, and this explains also how it happens that in certain lakes which are annually dry, *Ampullariæ* are always to be found. When the great heats approach and they plunge themselves into the mud or sand, they preserve in their branchial sacs the quantity of water necessary for them during the whole time of drought.’

This is one of those beautiful provisions which meet the naturalist everywhere. The tropical torrent and lake may yield to the dry season and burning sun, but the Ampullaria, secure in the possession of his water-bag, can afford, like the camel in the desert, to wait till the rains furnish a fresh supply, and again fill the parched channel.

Geographical Distribution of the Genus.—The rivers and lakes of warm climates. Species, some of them very large (*A. Guyanensis*, *A. Urceus*, and *A. Gigas*, for example) have been found in Asia, Africa, and America, especially the southern portion of the latter. Olivier (*Voyage dans l'Empire Othoman*, &c.) states that one is found in Lake Mareotis, in company with marine shells, but he did not succeed in obtaining the living animal. Mr. G. B. Sowerby hesitates to admit into the genus another reverse species called by Olivier *A. carinata*, abundant in a neighbouring river, but which, says Mr. Sowerby, if we may judge by his representation, has a horny operculum, and should therefore rather be considered as a *Paludina*.

The Rev. Lansdown Guilding divides his genus *Pachystoma*, the second of his family *Ampullariadæ*, *Pomacea* being the first, into two sections. The genus is characterised as being furnished with a thick, marginated, and often with a channelled lip; the operculum shelly.

§ 1.

Umbilicus small: shell globose.

This section comprehends *Ampullariæ globosa*, *cornu-arietis*, and *puncticulata* of Swainson.

Umbilicus evanescent.

This section consists of only one species—*Ampullaria crassa* of Swainson

Mr. Guilding's genus *Ampullaria* is characterised by having a simple thin lip and a horny operculum, and is divided into three sections.

§ 1.

Shell globose; umbilicus comparatively large.

Ampullariæ fasciata, *sordida*, *luteostoma*, *reflexa*, and *leucostoma* of Swainson.

§ 2.

Shell oblong; umbilicus comparatively small.

Ampullaria oblonga of Swainson.

§ 3.

Shell globose; aperture narrowed; umbilicus very large and deep; columella obsolete.

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* *Ante*, p. 462.

Ampullaria effusa of Swainson. Mr. Guilding is of opinion that this species forms the transition through *Ceratodes* to the *Planorbidæ*, and that it is probably more allied to that genus than to *Ampullaria*.

The genus *Ceratodes* of the last named author is characterised as having a simple lip; a horny operculum; a discoid shell; a very large and deep umbilicus, and an evanescent columella. The sole species given by him is *Ceratodes Cornu Arietis* above copied.

Mr. Swainson thus defines the genus *Ampullaria*:—Shell globose, rarely discoid, turbinate; spire very short; aperture oblong, pointed above, rounded below. The same author subdivides the four subgenera as follows:—

Ampullaria, Lam. Outer lip thin; operculum horny. Example, *Ampullaria fasciata* of Lamarck.

Pachylabra.* Outer lip thickened; operculum shelly. Example, *P. Globosa*, Sw.

Lanistes,* Montf. Shell reversed; the body-whorl ventricose only in the middle; outer lip generally thin. Example, *Lanistes Guinaica*, Sowerby's 'Manual,' f. 312. ('Malacology,' 1840.)

The number of recent species recorded by M. Deshayes in his Tables is twenty-four: in the last edition of Lamarck the numbers given are twenty-seven, including *Ampullaria avellana* and *fragilis*, of which we shall presently have occasion to speak more at large. Neither Mr. Swainson's *Ampullaria globosa*, Captain King's *Ampullaria Cumingii*, nor Mr. Lea's *Ampullaria Psalmon*, appears among these species. Mr. Swainson gives *Helix Ampullacea*, var. Gmelin, as a synonym of his *A. globosa*, but the former stands as a synonym for *A. fasciata*, Lam., in the last edition of the *Animaux sans Vertèbres*. Mr. Swainson considers it distinct, and quotes the description and figure of Chemnitz, who, like other authors, considered it a variety of *Helix Ampullacea*. The rivers of India are given as the locality, by Mr. Swainson.

Ampullaria globosa; the aperture closed by the operculum.

Some of these *Ampullariæ*, or *Apple Snails*, as they have been called by collectors, are of large size, as we have already stated; and some of these are figured in Lister, Chemnitz, and Spix: there are fine specimens, some from Mr. Broderip's collection, in the British Museum.

Ampullacera (Quoy.)

The *Ampullaria avellana* of Lamarck was founded on the *Nerita Nux avellana* of Chemnitz, and was placed by Bruguière among his *Bulimi*. Lamarck states that it was said to come from New Zealand. He observes that it is fluviatile and not marine, as Bruguière supposed it to be. Considering the state of information when Lamarck wrote, no better position could have been assigned to the shell than that in which he placed it. M. Quoy however, having had an opportunity of observing the animals of the so-called *Ampullariæ avellana* and *fragilis* alive, found, to his great surprise, that they presented none of the characters of the *Ampullariæ*. Upon further inquiry he ascertained that the anatomy of these animals constituted a particular type.

The following anatomical details are given by M. Quoy:—

The foot is large, transverse, yellowish, and separated by a furrow from the head, which has the form of a hood (chaperon) divided into two rounded lobes, deprived of tentacles, and supporting two very small sessile eyes on a fine yellow ground. Behind is a collar rather well formed by the border of the mantle, which only leaves a round hole at the right side for the entrance of the air, and offers a little more outwards the aperture of the anus upon a projecting infundibulated pedicle, as in *Auricula Midæ*. These parts, as well as those which the shell hides, are of a deep brown. The pulmonary cavity is large, and carries upon its floor (plancher) a large follicular depuratory organ, the aperture of which is readily seen on a very short anterior pedicle; the heart is behind it, and through the black pigment with which the floor is covered, a large vein is perceptible, which comes from the collar and goes along by the side of the rectum. After having lifted the partition which separates the abdomen, the œsophagus was found covered by two linear salivary glands fixed by their extremities. The stomach is not distinct, inasmuch as it leads into a globular gizzard (which is muscular and nervous, like that of a bird), containing in its interior four small depressions or fossets. The intestine which comes out of this gizzard, after having received the canals of the liver, which envelopes it, terminates by the rectum, without any apparent circumvolutions. The mouth is small and membranous. More externally is seen the exciting organ opening near the right eye, in the place where might be the tentacle of the same side. Behind it is a protractor muscle and a long tortuous canal. M. Quoy states that these parts are so delicate, that he has not been able to satisfy himself whether this canal is consequent and continuous with a similar one which is much longer, and envelopes the testicle, which is placed near the gizzard. At the right of the intromissive organ is the uterus, very convex backwards, where it receives the oviduct, which comes creeping along from the ovarium, which fills the posterior part of the tortuosity.

'Thus,' says M. Quoy, 'we have a mollusk breathing air although it lives in ponds, possessing the two sexes united, but being, notwithstanding, an insufficient hermaphrodite. It is apathic, and comes but little out of its shell, into which it retires very far upon the slightest touch. We found it sunk in the muddy sand, under some inches of saltish water, with its aperture full of earth. It is found in great abundance in New Zealand, where it is largely eaten by the natives.'

Generic Character.—*Animal* spiral, globular, convex; the foot short, quadrilateral, and with a marginal anterior furrow. Head large, flattened, notched into two rounded lobes supporting two sessile eyes, without the appearance of tentacles. Pulmonary cavity limited anteriorly by a collar, and having its aperture at the right border. Mouth membranous. Both sexes united.

Shell rather thick, globular, ventricose, deeply umbilicated, aperture round or oblique, with the borders united; spire short, but projecting.

Operculum horny, delicate, but little spiral, sometimes with a keel or projection. (Quoy.)

M. Deshayes adopts this genus, which he thinks one of the most interesting that has been for a long time discovered. 'It offers in fact,' says he, 'an entirely novel combination of an aquatic animal pulmonated and operculated, and fills up a lacuna. It is, with reference to the *aquatic pulmonata*, what the *Helicinæ* are with reference to the *terrestrial pulmonata*: *Ampullacera*, then, will constitute in the system not only a genus but a family, which ought to be placed at the end of that of the *aquatic pulmonata* without an operculum.'

Mr. Swainson (*Treatise on Malacology*, 1840) changes the name to *Thallicera*, as not liable, like *Ampullacera*, to be confounded with *Ampullaria*. He thinks that there can be no doubt that it is allied both to the operculated *Pectinibranchians* by its shell and its habitat, and to the pulmonary fluviatile *Limnacinæ* by its animal.

The only species known are *Ampullacera avellana*, Quoy (*Ampullaria avellana*, Lam.); and *Ampullacera fragilis*, Quoy (*Ampullaria fragilis*, Lam.). M. Deshayes refers to *fig.* 5, in Mr. G. B. Sowerby's plate of *Paludinæ* (*Genera*, No. xli.) for the last-named species.

Fossil Peristomians.

Valvata.—Mr. G. B. Sowerby states that he has never met with any other fossil species than those of a very recent lacustrine formation in Canada, and another in a volcanic stone from Auvergne, which he has figured in his *Genera*, No. xli.

M. Deshayes, in his Tables, notices only one fossil species (tertiary). In his last edition of Lamarck he records two, *Valvata multiformis* and *striata*; the first from the neighbourhood of Baden near Vienna, the second from Cefali near Catania.

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* See ante, p. 455.

† M. [illegible] Lamarck [illegible] figured by Olivier from the canal of Alexandria (Egypt). It is not [illegible]

Paludina.—Mr. G. B. Sowerby states that the fossil species abound in a thin bed immediately above the fresh-water bed at Headen Hill, and also in the Petworth marble.

M. Deshayes remarks that the number of species found in a fossil state is considerable. Those on which no doubt can be thrown belong to the tertiary beds, and are particularly abundant in the fresh-water formations. Some species, he observes, are quoted from the secondary strata, but they are, in his opinion, doubtful, it being possible to refer the casts on which they have been established as much to the genus *Turbo* as to the genus *Paludina*. Many species, he adds, have been confounded with the *Cyclostomata* and the *Bulimi*, but their extreme abundance in the places where they are met with does not permit the belief that they are terrestrial shells; and as they have besides the greater part of the characters of the *Paludinæ*, M. Deshayes has referred them to this genus, in his work on the fossil shells of the environs of Paris.

The number of fossil species recorded by the last-named author in his Tables is forty-one (tertiary). This number, as regards fossil species only, is reduced to thirteen in his last edition of Lamarck.

Paludina vivipara is noted in Mr. Mantell's 'Tabular Arrangement of the Organic Remains of the County of Sussex' (*Geol. Trans.*, vol. iii., 2nd series), as occurring in the Weald clay and the Tilgate beds, and *Pal. elongata* from the latter locality. Both are also recorded from the Ashburnham beds (lower division of the Hastings deposits).

Paludinæ carinifera, elongata, fluviorum, Sussexiensis, and 'two or more species, probably new,' appear in Dr. Fitton's list, in his valuable paper 'On the Strata below the Chalk' (*Geol. Trans.*, vol. iv., 2nd series).

Ampullaria.—Mr. G. B. Sowerby states that he is not certain that any fossil species of this genus exists: several, he adds, are mentioned by Lamarck, in the 'Annales du Museum,' among the fossil shells of the environs of Paris; others, which are thought to be genuine, are found in the London clay at Hordwell, and in the mixed stratum between the two fresh-water beds at Headen Hill, in the Isle of Wight. (*Genera.*)

M. Deshayes is of opinion that many fossil species given as *Naticæ*, ought to find a place among the Ampullariæ; whilst others, such as *Ampullaria avellana*, for example, ought to constitute a new genus, or should be referred to the *Naticæ*, whose characters they possess. 'If,' says M. Deshayes, 'we compare the shells of the *Ampullariæ* with those of the *Naticæ*, we perceive differences, not only because in the *Naticæ* the shell is polished and without an epidermis, but also because the incidence of the aperture on the longitudinal axis is different in the two genera. Nevertheless we must not attach too great importance to this character, for we have actually before us a species of *Natica* from 'Terre-Neuve,' which M. Petit de la Saussaye sent us: it has the form of an *Ampullaria*, its shell is delicate, and has an epidermis, its umbilicus is without a callosity, and, notwithstanding its horny operculum, is entirely that of the *Naticæ*. The animal itself does not differ essentially from the other *Naticæ*, except in the amplitude of the foot, and in the mantle.'

M. Deshayes goes on to state that up to the time when he wrote (1838) there have hardly been found any fossil species of *Ampullaria* about which there is not some doubt. Those shells which he has retained in the genus, from the character of the aperture and the small thickness of the shell, are, he says, never met with except in marine formations, and one may always suspect that the animals which produced them were different from those of the *Ampullariæ* properly so called. As these species have the characters of *Ampullariæ*, and we have no means of ascertaining the analogy of the animals, we are obliged to have recourse to the characters of the shells and to determine from them alone. But a little time since, he remarks, the belief was general that fossil *Ampullariæ* belonged exclusively to the tertiary beds; but it is now known that this genus occurs through all the 'terrains de sédiment,' for Mr. Sowerby has recorded a fine species in the transition beds, and M. Deshayes says that he knows many others in the oolitic series, and even in the lower chalk. (*Last edition of Lamarck.*)

The number of fossil species recorded by M. Deshayes in his Tables is fourteen (tertiary). In the last edition of Lamarck the number is sixteen.

The genus occurs in the list of the fossils of Lower Styria, given by Professor Sedgwick and Mr. Murchison, in their valuable paper 'On the Structure of the Eastern Alps' (*Geol Trans.*, vol. iii., second series), and in Mr. Mantell's 'Tabular Arrangement of the Organic Remains of the County of Sussex' (*ibid.*).

In the last-mentioned catalogue *Ampullariæ patula* and *sigaretina* are noted from the blue clay of Bracklesham and the arenaceous limestone or sandstone of Bognor. The form also occurs with a ? in the list from the chalk marl, and *Ampullaria canalicuta* is recorded in the same paper as occurring in the gault, or Folkstone marl.

PERISTO'MIUM, in mosses, is the ring or fringe of bristles or teeth which are seated immediately below the operculum, and close up the orifice of the seed-vessel. This organ is highly hygrometrical, and is supposed to assist in dispersing the spores, or seed-like particles by which these plants are propagated. Professor Lindley regards the fringes of the peristomium as incomplete leaves.

PERITONE'UM is the membrane by which the walls of the abdominal cavity are lined, and all the abdominal organs are covered. The name is also sometimes applied to the cavity itself. The arrangement of the peritoneum is in every respect similar to that of other serous membranes [MEMBRANE], except that at the extremity of the Fallopian tube it communicates with the mucous membrane of that tube, and thus is indirectly exposed to the external air. It is the peritoneum, and the epithelium covering it, which gives to all the organs within the abdomen their peculiar shining surfaces, and which by its duplicatures forms the mesentery, omentum, and other folds by which those organs are attached to each other and to the wall of the abdomen, and through which their vessels pass. [MESENTERY; OMENTUM.]

PERITONI'TIS is an inflammation of the peritoneum. It may exist either as an acute or as a chronic disease. The chief symptoms of the acute form are pain, swelling, and tenderness of the abdomen, accompanied with fever and a frequent small and hard pulse. The pain in peritonitis is usually much more severe than that of any other inflammatory disease of the intestines or other abdominal organs. It is acute and cutting, and sometimes occurs in paroxysms; it is generally diffused, but occasionally it is almost confined to a single part of the abdomen; but its most distinguishing character is that it is greatly increased by pressure, and in a severe case the patient cannot support so much as the weight of the bed-clothes, but lies on his back with his knees drawn up, and breathes quickly and lightly, moving the diaphragm as little as possible, so as to avoid the pain which pressure would excite in the inflamed parts. The bowels in cases of peritonitis are usually, but by no means constantly, constipated; commonly also there are present nausea, vomiting, and hiccup, and almost always excessive thirst and prostration of strength. If not checked in its course, acute peritonitis usually terminates fatally in from five to ten days, the patient becoming more and more depressed, and all the symptoms regularly increasing till within a short time of death, when the pain commonly ceases, and a deceptive improvement in many of the other signs of the disease takes place.

The usual morbid effects of peritonitis are the effusion of serum with lymph or pus into the cavity of the abdomen, and adhesions of the opposite surfaces of the several organs within it. After death from acute peritonitis, the walls of the abdomen and the surfaces of the organs chiefly or all affected, are found thickened, swollen, and vascular, often with blotches of dilated blood-vessels, and more or less firmly adhering together by the lymph which is effused between them, and which, if the patient survives for a certain length of time, becomes vascular, and is converted into the usual tissue of adhesions or false membranes. [INFLAMMATION.]

The causes of peritonitis are various. Like other acute inflammations, it may occur after exposure to cold, or other common excitants of disease; but it is more commonly produced by injuries of the peritoneum, as by tumours developed within the abdomen, by the obstructions which occur in strangulated hernia, and intussusception, of which it is a constant consequence, by the spreading of disease from adjacent viscera, by heavy blows and falls on the abdomen, by penetrating wounds inflicted in operations for hernia and in other circumstances, by the passage of foreign bodies into the cavity of the abdomen, and especially by the ulcerative perforation or accidental rupture of any of the organs [illegible] tained within it, and the escape of their contents, circumstances which are productive of the most certainly and rapidly fatal form of the disease.

From these causes acute peritonitis may occur at all periods of life, but it more frequently affects persons of the middle age than any others. Women in child-bed are peculiarly liable to it. They may be attacked either with common peritonitis, presenting no remarkably peculiar symptoms or effects; or they may have that which is especially called puerperal peritonitis. In cases of the latter disease however the peritonitis is not always the most important symptom, but must rather be regarded merely as one of the accidents of the peculiar fever by which the patient is affected, and which often assumes the character of an epidemic.

The appropriate treatment of peritonitis consists in the early employment of copious general bleedings. The quantity of blood abstracted must be as great as the patient's health will permit; and after one full bleeding, it is usually advisable to abstract other small quantities at intervals of from six to twelve hours till the severity of the disease is distinctly reduced. When this has been effected, or even coincidently with the general bleedings, blood should be drawn from near the seat of the disease by the repeated application of numerous leeches, and hot fomentations should in the intervals be assiduously applied to the abdomen. Of internal medicines the most effectual is calomel, of which, after the first general bleeding, three or four doses of five grains or more, with one or two grains of opium, should be given at intervals of about four hours, and afterwards smaller doses till a slight salivation is produced. During all the time of the treatment, the lowest diet only should be allowed, unless the patient is evidently sinking. In that case, and generally in the later stages of the disease, a more nutritious diet may be given, but there is perhaps no affection in which relapses are so liable to occur in consequence of the early or injudicious use of stimulating food.

Acute peritonitis sometimes, after fifteen or twenty days' continuance, assumes a *chronic* form; or the inflammation may from its commencement be of slow progress. In either case the symptoms are usually very obscure; the pain being but slight or discoverable only by considerable pressure, and the swelling or tension of the abdomen occurring only at a late period of the disease. Its most important symptoms are the low fever, the constant thirst, the hectic flushings of the face, the emaciation, languor, and regularly increasing debility by which it is accompanied. It rarely proves fatal till after many months have elapsed; and its effects are found after death to be thickening and increased density of all the peritoneal coverings, increased vascularity or blackness of their surfaces, which in many cases are beset with vast numbers of minute greyish-white tubercles, and effusions of serum with lymph or pus wherever the adjacent organs are not connected together by the adhesions. The treatment of chronic peritonitis is usually unsatisfactory and of doubtful benefit. Local bleedings should be frequently employed, and blisters or other counter-irritants should be applied over the abdomen. The diet should be light and nutritious, and, as often as they seem necessary, mild purgatives may be administered. Frictions of ointments containing mercury or iodine are also useful, and iodine should be administered internally when the patient is of a scrofulous constitution.

PERIWINKLE, or **PEERIWINKLE**, the vernacular name for the well known species of *Turbo* which is hawked about the streets and sold in great quantities, especially to the poorer classes. In very hot weather and the decline of the year they are often unwholesome, especially if there be any predisposition to disordered functions of the abdominal viscera prevalent. Instances have been known where the introduction of a cargo of periwinkles into a village has been followed by a fearful amount of death consequent upon attacks similar to cholera, if not cholera itself. Taken in moderation and when in high condition, they do not seem to be an unhealthy food. The Linnæan name for the species is *Turbo littoreus*. Pennant states the belief of the Swedish peasants that when these shells creep high up the rocks, they indicate a storm from the south. Linnæus quotes Ström, the *Norwegian*, for a different augury when it creeps up the strand; he says that it denotes a land wind and a calm at sea,—'quando littora adscendit, indicat ventum à terra, pacatum ad litus.' The food of the periwinkle is generally considered to be vegetable only. [TURBINIDÆ.]

PERIZONIUS, JAMES VOORBROEK, born at Dam in the province of Groningen, in 1651, studied at Deventer and afterwards at Leyden under *Grævius*. He chiefly applied himself to philological and historical studies. In 1674 he was appointed rector of the gymnasium of Delft; in 1681 he was made professor of eloquence and history at Franeker. In 1693 he removed to Leyden as professor of history and the Greek language. He died at Leyden in 1715. Perizonius was one of the most distinguished scholars that Holland has produced. He published numerous dissertations on subjects of classical learning, and editions of Qu. Curtius, of Dictys Cretensis's 'Trojan War,' and of other Latin and Greek authors. Niceron, in his 'Mémoires,' has given a list of his works, which however is not complete. Among his more important works, the following deserve notice: 1, 'Animadversiones Historicæ, in quibus quamplurima in priscis Romanarum rerum utriusque linguæ auctoribus notantur; multa etiam illustrantur atque emendantur,' 8vo, Amsterdam, 1685. In this work the author compares many passages of various historians relating to particular events, and also to other subjects of language, habits, and civil polity; it is a work full of erudition, and useful to classical scholars; 2, 'De Usu atque Utilitate Græcæ Romanæque Linguæ;' 3, 'Rerum per Europam Sæculo XVI gestarum Commentarii historici,' a work imitated by Russell, in his 'History of the Sixteenth Century;' 4, 'Disquisitio de Prætorio;' 5, 'Dissertatio de Ære Gravi;' 6, 'Dissertatio de Morte Judæ;' 7, 'Origines Babylonicæ et Ægyptiacæ,' 2 vols. 8vo, Leyden, 1711; a work, the importance of which has been superseded by the more recent investigations into Egyptian chronology and antiquities. The 'Opuscula Minora' of Perizonius, consisting of orations and dissertations, were published at Leyden in 1740, with a biography of the author. Perizonius left his MSS. to the Leyden library.

PERJURY, by the common law of England, is the offence of falsely swearing to facts in a judicial proceeding. To constitute this offence the party must have been lawfully sworn to speak the truth by some court, judge, or officer having competent authority to administer an oath; and, under the oath so administered, he must wilfully assert a falsehood in a judicial proceeding respecting some fact material to the subject of inquiry in that proceeding. In a legal sense therefore the term has a much narrower import than it has in its popular acceptation. It is said by Sir Edward Coke (3 *Inst.*, 166) that 'the deposition must be direct and absolute, and not *as I think*, nor *as I remember*, nor *as I credit*, &c.;' but this doctrine has been long since exploded; and it is now clear that a person may commit perjury by swearing that he *believes* a fact to be true which he *knows* to be false. It is immaterial, with reference to the offence of perjury, whether the false statement has received credit or not, or whether any injury has been sustained by an individual in consequence of it. The characteristic of this offence therefore, by the law of England, is not the violation of the religious sanction of an oath, nor the wrong done to the person or property of another, but the injury done to the administration of justice by false testimony or information in a judicial proceeding. (*Fifth Report of Commissioners on Criminal Law*, p. 23.)

The history of this offence in the common law is entirely dependent upon the history of the trial by jury. [JURY.] Where perjury is mentioned by Bracton and Fleta, these ancient authors exclusively allude to the offence of jurors in giving a wilfully false verdict; and as the jury appear to have been originally merely witnesses, speaking from their personal knowledge of the facts, and sworn to *speak the truth*, their misconduct in giving a false decision might be justly treated as perjury. As population and civilization increased, the character of the trial by jury was changed, and witnesses were called in order to inform the jurors respecting facts of which the latter were commonly ignorant, though the institution was originally founded upon the presumption that they must necessarily be acquainted with them. It is probable that this alteration did not take place at once, but that it was one of those gradual introductions by means of which laws silently adapt themselves to changes in national habits and circumstances. At all events, there is no trace in the statutes, or in the reported proceedings of the courts, of any penal law against perjury in witnesses, as distinguished from that of jurors, earlier than the reign of Henry VIII.; the date of the introduction of the witness's oath to speak the truth, in use at the present day, is unknown, and no form of process for securing the attendance of witnesses (except where they were added to the jury) seems to have existed before the reign of Elizabeth. [JURY.] These facts tend to show that the offence of perjury has been gradually moulded into its present definite character, by the corresponding change in the functions of the jury. This change however was complete in the time of Sir Edward Coke, as he defines perjury nearly in the same terms in which it is described in more modern text-books. (3 *Inst.*, 163.)

A defendant in equity is guilty of perjury by false swearing in his answer to a plaintiff's bill. The defendant is in fact also a witness, for he is bound to answer on oath to the matter contained in the bill, and the plaintiff may read the whole or any integral portion of the defendant's answer as evidence against such defendant. In the case of an answer in equity, the offence of false swearing falls exactly within the definition given at the head of this article.

The punishments of perjury by the common law were, discretionary fine and imprisonment, and the pillory, which latter punishment was abolished in 1837. To these was added an incident probably derived from the punishment of jurors in antient times, namely, a perpetual incapacity to give evidence in courts of justice. A further punishment was authorised by the statute 2 George II., c. 25, s. 2, by which it was enacted that imprisonment with hard labour for seven years might be awarded, or transportation for a like period.

Subornation of perjury consists in wilfully procuring any person to commit perjury; and it is essential to this offence that the false oath should be actually taken. The same punishment is assigned to subornation as to perjury.

Besides perjury and subornation of perjury at common law, the statute 5 Eliz., c. 9, contains a legislative enactment respecting these offences; but as this enactment is more limited than the common law, both in the definition of the crime itself and in the punishment to be applied to it, it has seldom been used in recent times; and within the last century there have been few if any instances of prosecutions under this statute. There are also many statutes by which oaths are required as a sanction to statements of facts under a variety of circumstances, and otherwise than in judicial proceedings; and these statutes frequently declare that false swearing in such cases shall amount to perjury, and be punishable as such. The Commissioners on Criminal Law have pointed out the practical objections to provisions of this kind, and have suggested a mode of rendering the law upon the subject more precise by drawing a line of distinction between the dangerous crime of false testimony in courts of justice and mere false swearing to facts on other occasions. See *Fifth Report*, pp. 25 and 50.

By the 5 & 6 William IV., c. 62, declarations may now be substituted for oaths in many extrajudicial proceedings. [OATH.]

PERM, an extensive government of Russia, is situated partly in Europe and partly in Asia, between 56° 30′ and 61° 30′ N. lat. and 53° 20′ and 64° 10′ E. long. It is bounded on the north by Wologda and Tobolsk, on the east by Tobolsk, on the south by Orenburg, and on the west by Viatka. The area, according to Schubert and most other writers, is about 125,000 square miles, or more than double the area of England and Wales. The population, according to Schubert, is 980,000, but according to Hörschelmann and Cannabich, it is 1,270,000; M. Köppen however made it amount, in 1838, to 1,488,800.

This government is mountainous, and is divided by the Ural mountains, which traverse it from north to south, into two unequal parts, the smaller of which is in Asia. But though the loftiest summit of the Ural chain, the Pavdinskoï-Kamen, is 6400 Paris feet above the level of the sea, the chain rises so gradually that travellers approaching it on the road from Perm to Ekaterinenburg are disappointed in finding themselves at the summit (which, on this road, it is true, is only 1500 feet) without perceiving that they were making an ascent. The breadth of the chain varies from seven to seventy miles, and the part belonging to the government of Perm is 460 miles in length. The mountainous parts are covered with forests, in some of which there are immense marshes. The southern parts of the government, on the European side, are fertile and well cultivated, but the other portions are more suitable to pasture than tillage. The course of the rivers is determined by the Ural chain. The principal river on the west side is the Kama, among the numerous affluents of which is the Tchoussovaia, which flows from some lakes at the foot of the chain, and joins the Kama above the town of Perm. On the other side of the mountains, the Sosva, the Toura, and the Sceth flow eastward to join the Tobol. There are above [illegible] lakes, most of them east of the mountains. There are also sulphureous and other mineral springs. The climate is unequal, being very rigorous in the mountains and in the eastern part, but milder towards the south-west. It is however generally healthy. Agriculture employs a great number of hands, but the government does not produce corn sufficient for the consumption of the inhabitants. Rye, barley, oats, potatoes, and flax are grown. The climate is unfavourable to horticulture. The forests, of which a very large proportion belongs to the crown, consist of the pine, the larch, the birch, and the lime-tree; in the south-eastern part the oak, the ash, the birch, and the elm are found, and in the districts of Tcherdyne and Werkhotourie, the cedar. These forests, in which, as in other provinces, enormous waste is committed, supply fuel for smelting the produce of the mines. Game and fur-bearing animals abound. The government of Perm owes its riches to its minerals, and the working of the mines employs the greater part of the inhabitants. They produce iron, copper, platinum, a little lead, gold, silver, salt, marble, jasper, agates, amethysts, loadstone, and some diamonds. Of late years they have yielded on an average 250 poods (pood = 36 lbs.) of gold and 100 poods of platinum. The richest gold-mines are those of Beresoff. The crown possesses twenty-five forge-smelting-houses, in which 33,000 masters and workmen are employed; private individuals have 99 smelting-houses for iron and 35 for copper. The mines of the Ural mountains yield annually about 300 poods of gold, 200,000 poods of copper, and 5,500,000 poods of iron. The greater part of these products belongs to the government of Perm, which also produces about seven million poods of salt annually.

The number of domestic animals is, in round numbers, about 580,000 horses, which are necessary for the service of the mines and the carriage of their produce; 65[illegible] horned cattle; 680,000 sheep; 390,000 swine; and [illegible] goats. The Baschkirs breed a great quantity of bees: formerly they had camels, but the race appears to be extinct. The Woguls, in the north, have a few reindeer.

Three-fourths of the inhabitants are Russians. The remainder are Permians, descended from the antient inhabitants of the country between the Ural mountains and the White Sea, and various Tartar races. All the inhabitants profess Christianity, with the exception of about 3[illegible] Tartars and Baschkirs of both sexes, who are Mohammedans, and a very few Tcheremisses and Woguls, who are still pagans.

There are some manufactures of cloth, leather, soap, candles, &c. Trade is very brisk, partly in consequence of the facility for water-carriage on the Kama and its tributaries, and partly owing to the thirty-nine annual fairs, eighteen of which are held in the towns, the most considerable being that of Irbit. With respect to education, Perm is under the university of Kasan, but education is confined to a very small portion of the inhabitants. According to Schmidtlin, whose book was published in 1835, there were, by the latest accounts that he could procure, which seem to have been of 1832, 62 schools, with 123 teachers and [illegible] pupils, which was one scholar out of 294 inhabitants; taking the population at that time, as he does, at about 1,200,000.

The town of PERM, the capital of the government, is a modern town, having been built in obedience to a ukase of Catherine II., issued in 1780. It is situated in 5[illegible] N. lat. and 56° 30′ E. long., at the conflux of the Iagousc[illegible] and the Kama. The streets are broad and regular, the houses almost all of wood, and the town is surrounded by a boulevard planted with trees. There are only two churches, so that it does not look like a Russian town. It is described by Mr. Engelhardt as a dull town, destitute of resources. The population is about 10,000. It is a bishop's see. Ekaterinenburg, with 12,000 inhabitants, is a place of much greater importance. [EKATERINENBURG.] Kungar, at the junction of the Iron and the Sylwa, a fortified town with 6000 inhabitants, has manufactures of leather and soap. Within a mile of the town, on the banks of the Sylwa, there are caverns in the rock, which appear to have been formerly inhabited by many thousand families. Solimansk, at the conflux of the Uffolka and the Kama, has 5000 inhabitants, five churches, and two convents. The salt-works at Solimansk belonging to the crown yield 1,300,000 poods annually; and those belonging to the Stroganoff family, four millions and a half of poods. Owing to the road to Siberia passing through this town, it has a considerable trade. There is a botanic garden, in which the principal plants of Russia and Siberia are cultivated. Nischnei-Newiansk has 12,000 inhabitants, who have considerable manufactures of lacquered or japanned ware. Irbit, or Irbizk, on the Neiwa, near its confluence with the Irbit, has 3500 inhabitants, and is celebrated for its annual fair, which is frequented by Bokharian, Persian, Armenian, Greek, &c. merchants. The value of the goods brought to the fair is about 35 millions of rubles, and is annually increasing. In 1836 the value of Russian goods was 30,387,830 rubles; of European, 395,800; of Chinese, 3,258,420; of Bokharian, 745,000; horses, 15,000: total, 34,800,000 rubles. Irbit is a neat, regularly built, and rapidly improving town.

(Schmidtlin, *La Russie et la Pologne;* Hörschelmann, *Handbuch;* Erman, *Reise nach Siberien; Russian Official Journals.*)

PERMUTATIONS. [COMBINATIONS.]

PERNA. [MALLEACEA, vol. xiv., p. 385.]

PERNAMBUCO, a seaport in Brazil, situated in 8° S. lat. and 34° 50′ W. long. It consists of two towns, Recife and Ollinda, nearly three miles distant from one another. The Citade do Recife consists of three different parts, called Bairro do Recife, Bairro de São Antonio, and Bairro de Boa Vista. The Bairro do Recife is built on the south-eastern extremity of a low and sandy peninsula formed by the mouths of two small rivers, the Capibaribe on the south, and the Biberibe on the north; being contiguous to the harbour, it is the seat of the commerce. The harbour is formed by a recife, or chain of reefs, which extends along the whole coast of the projecting portion of Brazil, from Bahia on the south to Cape S. Roque on the north. Opposite Recife this reef runs parallel to the shores and about 200 yards from it, and resembles a large flat wall, elevated about six feet above low-water mark. This reef, which is perpendicular on the land-side, and slopes gradually towards the open sea, is interrupted by a break north of the northern extremity of Recife. This break, which is rather narrow, is the entrance of the port. Inside the reef the water is not agitated by the swell of the sea, and vessels are completely sheltered. The port itself is divided into two parts by a shoal. The southern part, called Porto do Mosqueiro, is only used by vessels not drawing more than 14 feet of water. Larger vessels remain in the northern harbour, opposite the entrance, which is called Pouço, and is sometimes exposed to a swell from the sea, especially during spring-tides, which rise five feet. The town is indifferently built, and the streets are narrow, but generally paved. The Rua das Cruzes, which is the only wide street, contains many substantial houses. The storehouses are extensive. A stone bridge leads from Recife to the Bairro de S. Antonio, which occupies the western part of an island formed by two branches of the Capibaribe. Its streets are better than those of the Recife, and have raised foot-ways laid with bricks; but they are not paved, and are generally sandy. There is a small square, surrounded with neat houses, and forming a kind of bazaar, consisting solely of shops, in which a variety of articles are sold. The treasury and the governor's palace are situated in S. Antonio. This part of the town is united to the Bairro de Boa Vista by a bridge chiefly of wood. It is built with great irregularity on an undulating plain, and has lately increased more than the other parts of Recife, many neat country-houses having been erected in the plain, which are surrounded by groves of cocoa-nut trees. As the tide enters the rivers some distance above the places where the three towns are built, the water is not fit for drinking. A reservoir has accordingly been constructed near Ollinda, by forming a sort of barrier, denominated a varadoiro, across the river Biberibe, which impedes the farther advance of the tide, and accumulates the fresh-water above. This barrier, which also serves as a bridge or passage over the river to Ollinda, is in part covered by a handsome archway, below which the water passes, partly through circular spouts, and partly through larger and square channels. From this place the water is carried in canoes to Recife. Recife has a college, with three professors of Latin, one of philosophy, and another of eloquence and poetry.

Ollinda is beautifully situated upon a cluster of eminences which are connected with the mountains farther west. It was once a considerable town, but has been on the decline for the last two centuries. It is rather well built, contains many convents, an episcopal palace, finely situated; a botanical garden of trees and exotic plants, mostly brought from Asia; and a college, with professors of Greek, Latin, French, geography, rhetoric, universal and ecclesiastical history, philosophy, dogmatic and moral theology, and drawing. Ollinda contains about 1200 houses and 8000 inhabitants, and is inhabited by rich individuals and men of letters. The Citade do Recife contains more than 60,000 inhabitants, chiefly occupied in its extensive commerce. S. Antonio is by far the most populous of the three towns, and most of its inhabitants are mechanics. The exports of Pernambuco, in 1828, consisted of 1,513,120 arobas of sugar, 35,400 bales of cotton, 53,000 hides, 200 puncheons of rum, and some other articles to a less amount, as leather, drugs, Brazil wood, &c. In the same year were imported 40,000 casks of cod, mostly from England; 24,000 casks of flour, from the United States and Germany; 10,000 pipes of wine; 300 pipes of brandy; 400 pipes of olive-oil; 600 pipes of vinegar; great quantities of British manufactured goods, especially of cotton; silk goods from France and China; and several other articles of less amount. The number of vessels which annually depart from this port to Europe and North America is about 200.

The town of Pernambuco was taken by the Dutch in 1630, and remained in their possession to 1654. The Dutch did more for its public works in that short period than has been done ever since.

(Henderson's *History of Brazil;* Spix and Martius *Reise in Brasilien.*)

PERNAU. [LIVONIA.]

PERNIS. [FALCONIDÆ, vol. x., p. 184.]

PERODICTICUS, Mr. Bennett's name for a *Lemuridous* species, probably, in his opinion, the animal noticed and imperfectly represented by Bosman under the name of *Potto.*

Generic Character.—Face somewhat lengthened. *Limbs* subequal. *Tail* moderate. *Index* very short, the ungueal phalanx alone exserted.

Dental Formula:—Incisors $\frac{4}{6}$; Canines $\frac{1-1}{1-1}$; Molars $\frac{4-4}{3-3}$?

Mr. Bennett further describes the upper incisors as being subequal, and the lower as slender and sloping (*declives*); the canines as conic, compressed, with the anterior and posterior margins acute; the first upper molar as smallest, the second larger, and both conic; the third as acutely tuberculate, the tubercles being two externally and one internally; the fourth like the preceding, its internal tubercle rather larger than the rest (absent in the young specimen); the lower molars are described as consisting of two, conic and equal, and a third externally acutely bituberculated, and having one internal tubercle; the rest absent.

Example, *Perodictus Geoffroyi*, Bennett.

Description.—Colour chestnut, paler below, with a few ash-coloured hairs interspersed; fleece woolly.

Locality.—Sierra Leone.

This, with another animal (*Aulacodus Swinderianus*, Temm.), was presented to the Zoological Society of London by Mr. Boyle, colonial surgeon, Sierra Leone. The brine into which they had been put upon their deaths, which occurred upon the homeward passage, unfortunately proved too weak for their perfect preservation, but they were, on their arrival, transferred to strong spirit, with the view of preserving them as much as possible.

Mr. Bennett gives the following as the synonyms of this highly interesting animal: *Potto*, Bosman (*Guin.*, ii. 35, No. 4?); *Lemur Potto*, Gmel. (Linn., *Syst. Nat.*, 42?); *Nycticebus Potto*, Geoff. (*Ann. Mus.*, xix., 165?); *Galago Guineensis* (Desm., *Mamm.*, 104, No. 127?); and describes the head as rounded with a projecting muzzle, the nostrils lateral, small, sinuous, with an intermediate groove extending to the upper lip, the tongue rough with minute papillæ, rather large, thin, and rounded at the tip, and furnished beneath with a tongue-like appendage, which is shorter than the tongue itself, and terminates in about six rather long lanceolate processes, forming a pectinated tip. The eyes are small, round, somewhat lateral and oblique; the ears moderate, open, and slightly hairy both within and without; the body rather slender, and the fingers moderately long. The index on the forehands is excessively short, the first phalanx being concealed, and the ungueal phalanx (the only phalanx free) being barely large enough to support a rounded nail, which did not exist on the specimen, but of which there was an apparent *cicatrix*. Nails of all the other anterior fingers flat and rounded; those of the hinder hands similar, except that of the fore-finger, which, as in the *Lemurs* generally, is long, subulate, and curved. Tail of moderate length, covered with hairs resembling those of the body. Hairs generally long, soft, and woolly, each of them mouse-coloured at the base, rufous in the middle, and paler at the tip; some few tipped with white. This arrangement produces on the upper surface and on the outside of the limbs a chestnut hue, slightly mixed with grey; the under surface is paler. Muzzle and chin almost naked, and having only a few scattered whitish hairs. Length of the head two inches and two-tenths; of the body six inches; of the tail one inch and six-tenths, or, including the hairs, two inches and three-tenths. Breadth of the head, in front of the ears, one inch and four-tenths; distance between the eyes four-tenths; from the anterior angle of the eye to the end of the nose seven-tenths; from the eye to the ear fifteen-twentieths; length of ears behind, five, of their aperture eight, breadth five-tenths. Elaborate measurements of the anterior and posterior limbs are given by the author, to which we refer the reader.

Habits.—Mr. Boyle describes the animal as slothful and retiring, seldom making its appearance except in the night-time, when it feeds upon vegetables, chiefly, he believes, the *Cassada*. The colonists know it as the *Bush Dog*.

Mr. Bennett remarks that this genus is readily distinguishable from the other *Lemuridæ* by the comparative length of the tail. In this, he observes, in the moderate elongation of the face, in the moderate size of the ears, in the equality of the limbs, and especially in the extreme shortness of the index of the anterior hands, reside its essential characters. The latter character is regarded by Mr. Bennett as especially important, and he considers it as indicating its typical station in a family, all of which are distinguished from the neighbouring groups by a variation in the form of the index or of its appendages. 'In the *Lemuridæ* generally,' says Mr. Bennett, in conclusion, 'the nail of the index of the hinder hands is elongated and claw-shaped, and unlike those of the other fingers, which are flat, as in the monkeys. This is frequently accompanied by an abbreviation of the index of the fore-hands, which becomes in *Loris*, Geoff., very considerable, and is in *Perodicticus* carried to its *maximum*, that organ being here almost obsolete.' (*Zool. Proc.*, 1831.) [LEMURIDÆ; OTOLICNUS.]

PERO'NIA. [CYCLOBRANCHIATA, vol. viii., p. 249; LIMAX, vol. xiii., p. 486.]

PERONNE. [SOMME.]

PEROUSE, JEAN FRANÇOIS GALAUP DE LA, a distinguished French seaman and navigator of the last century, was born at Alby in the department of Tarn, in 1741. He entered early into the French navy, and was appointed midshipman in 1756. He distinguished himself in the battle of Belleisle (1759), and was taken prisoner. After the peace of 1762 he returned to his native country. In 1773 he visited the East Indies, where he served to 1777. In the war from 1778 to 1783 he distinguished himself on several occasions, and in the beginning of 1782 he was sent with three vessels to take possession of the establishments of the Hudson's Bay Company, on the shores of the bay from which the company derives its name. He took Fort York on the 24th of August, without resistance, as there was no garrison, and after having ordered the fort to be destroyed, he re-embarked and abandoned it. Having been informed that several Englishmen had escaped into the woods, and fearing that they would perish with hunger or fall into the hands of the savages, he left some provisions and arms, an act of humanity which was acknowledged by the English with gratitude. At Fort York he found the manuscript of Hearne's 'Journey to the Coppermine River,' which he was inclined to take to France, but Hearne declaring that it was his private property, he restored it to him, on the express condition that it should be printed on his return to England. The promise was made, but only performed thirteen years after.

After the re-establishment of peace (1783), the French government wishing to rival the English in making discoveries in the Pacific, La Perouse was appointed commander of a squadron, consisting of two frigates, the Boussole and Astrolabe. He sailed from Brest on the 1st of August, 1785, and went round Cape Horn. After doubling Cape Horn, he sailed to 60° N. lat., and then coasted along the western coast of North America to Monterey in Upper California, which coast had previously been examined by Cook and Vancouver. From Monterey he went to Canton, and thence along the eastern coast of Asia to Avatsha in Kamtchatka. This is the most important part of his voyage, as he surveyed a coast which previously was very imperfectly known. From Avatsha he sent one of his officers, Lessep, with an account of his voyage, to Paris by land. After leaving Avatsha he sailed to the Navigators' Islands, where the Astrolabe lost her captain and eleven of the crew, who were killed by the natives. After touching at the Friendly Islands, he sailed to Botany Bay, where he found that Governor Phillip had arrived for the purpose of founding the first British colony in Australia. From this place he sent to Europe the continuation of the account of his voyage, and after leaving Botany Bay he was never heard of. It was supposed that his vessels were wrecked, and the French [illegible] sent several ships to ascertain his fate. It was finally ascertained that his vessels had been wrecked on one of the islands of Santa Cruz, also called Queen Charlotte Islands. This island is called by the English Wanicoro, or Vanicolo, and by the French Isle de Recherche. (La Perouse, *Voyage autour du Monde*.)

PERPENDICULAR (overhanging), the name given in geometry to a line or plane which meets another line or plane without inclining to one side or the other, so as to appear to proceed directly towards the other line or plane. The subject will be considered in a mathematical point of view under RIGHT ANGLE.

PERPETUAL MOTION. [MOTION.]

PERPETUATION OF TESTIMONY. A party who has an interest in property, but not such an interest as enables him immediately to prosecute his claim, or a party who is in possession of property and fears that his right may at some future time be disputed, is entitled to examine witnesses in order to preserve that testimony, which may be lost by the death of such witnesses before he can prosecute his claim, or before he is called on to defend his right. This is effected by such party filing a bill in equity against such persons as are interested in disputing his claim, in which bill he prays that the testimony of his witnesses may be perpetuated. This is the only relief that the bill prays. If the prayer of the bill is granted, a commission issues to examine the witnesses, whose depositions are taken in the usual way in suits in equity. The depositions, when taken, are sealed up and retained in the custody of the court which grants the commission. When they are required to be used as evidence, they can be so used, by permission of the court, by the party who has filed his bill or those who claim under him, and they can be read by the direction of the court as evidence on a trial at law, if it is then proved that the witnesses are dead, or from any sufficient cause cannot attend. If the witnesses are living when the trial takes place, and can attend, they must be produced. A defendant to such a bill may join in the commission, and may examine witnesses under the commission, and he is entitled to use their depositions as evidence in his favour at a future trial. (1 Mer., [illegible])

A bill to perpetuate testimony may be filed by any person who has a vested interest, however small, in that thing to which he lays claim. The parties, defendants to such [illegible] are those who have some adverse interest to the plaintiff. In order that the testimony which the plaintiff seeks to perpetuate may be good evidence for him at the trial, he must make all proper parties defendants to his bill, who may be generally described to be such persons as would be necessary parties to a bill in equity by the plaintiff to enforce [illegible] maintain his rights, if a court of equity could take [illegible]zance of the matter, and the question between the [illegible] and such parties could then be raised. The evidence [illegible] taken may be read at the hearing of a cause, or at a trial at common law against all such parties to the bill, and [illegible] who claim through or under them.

A bill to perpetuate testimony and a bill to examine witnesses De bene esse are sometimes confounded. The [illegible] to perpetuate testimony has been already described. [illegible] bill to examine witnesses De bene esse is only filed when an action has been brought, and the plaintiff is afraid that his witnesses, owing to age or infirmity, may die before the [illegible] may take place, or he has only one witness to an important fact. Both these are in a sense bills to *preserve* or *perpetuate* testimony; but the one is filed before the matter which may be in dispute can be the subject of judicial investigation, and the other is filed when an action has been already brought. As courts of law can now examine witnesses on oath upon interrogatories in an action depending in those courts (1 Wm. IV., c. 22), an application to a court of equity for such purpose is no longer necessary.

Witnesses may be examined *De bene esse* in a suit in equity, when it is necessary to secure their evidence at a period of the suit prior to the regular time for examination of witnesses in the cause. But this is only a provisional examination, and the evidence can only be used in case the witnesses cannot be examined at the proper time for the examination of witnesses in the cause. [DEPOSITION.]

PERPETUITY, the technical term for a yearly payment or annuity which is to continue for ever; also called a perpetual annuity.

PERPETUITY. (Law.) [SETTLEMENT.]

PERPIGNAN, a town in France, capital of the department of Pyrénées Orientales, at the junction of the little river Basse, or Canals, with the Tet, 424 miles in a direct line south of Paris, or 564 miles by the road through Orléans, Limoges, Cahors, Montauban, Toulouse, and Narbonne.

Perpignan was anciently a mere hamlet, called Coreb, which gradually increased and became the capital of Roussillon. Having passed with the rest of that province into the hands of the kings of Aragon, it became in 1349 the seat of a university founded by Pedro, one of those kings. In 1475 it was besieged and taken by famine, after a vigorous resistance, by Louis XI. of France. Having been restored to Spain, it was again taken in 1642 by Louis XIII., and was included in the cession of Roussillon to the French. In the wars which followed the French revolution, the Spaniards were defeated under the walls of this town by the French, A.D. 1793. In 1604 Perpignan was made by transfer the seat of a bishopric.

The town is situated partly on the slope of a hill, and partly in the plain at its foot, on the right or south bank of the Tet, over which are two bridges. It is fortified by an old wall and by bastions and outworks of later construction. A strong citadel commands the town on the south side. The fortifications were all thoroughly repaired in 1823. There are barracks for 3000 men, built by Louis XIV., and occupying one side of the parade. Perpignan is divided into the old and new towns. The streets, with the exception of one or two, are narrow and dark, and the houses are ill built. The cathedral is the most remarkable building, and, but for the want of a porch, would be a fine structure. There are three or four other churches and a convent. The town-hall, the court-house, the mint, and the theatre, are all inferior structures.

The population in 1831 was 16,272 for the town, or 17,114 for the whole commune; in 1836 it was 17,618 for the commune. The manufactures are woollen cloth and woollen stuffs, lace, leather, soap, and sails. Cork-cutting is carried on. The trade of the town is facilitated by its situation on the only high road from France into Spain at this end of the Pyrenees, and by its vicinity to the Mediterranean, from which it is distant about six miles: the chief articles of commerce are the red wines of Rivesaltes, the liqueur wines of Collioure and other places, and the stout red wines of Banyuls, all produced in the department; brandy, oil, silk, wool, iron, and cork. There are six yearly fairs. There are at Perpignan a seminary for the priesthood; a high-school, with a cabinet of natural history attached to it; a museum, a library of 15,000 volumes, a school for linear drawing and architecture, and a school of music; an agricultural society, a botanic garden, a departmental nursery, a government sheep-fold for merinos, and a government stud; two hospitals, one of them military; a theatre and public baths; a subordinate court of justice, a commercial court (*tribunal de commerce*), and several government offices, administrative and fiscal.

The diocese comprehends the department; the bishop is a suffragan of the archbishop of Alby. The arrondissement has an area of 331 square miles, and comprehends seven cantons or districts, each under a a justice of the peace, and 81 communes. The population in 1831, was 72,814; in 1836, 76,224.

PERRAULT, CLAUDE, born at Paris in 1613, has earned a memorable name in the history of art as the designer of one of the finest monuments of modern architecture. He was the son of an advocate, and was brought up to the medical profession, but extended his studies to other branches of science, particularly mathematics and architecture. His attention became more especially directed to architecture on being engaged by Colbert to undertake a translation of VITRUVIUS, the first edition of which appeared in 1673, in a folio volume, with plates after his own drawings. If he did not always comprehend the meaning of that exceedingly obscure writer, he had in the meanwhile given indisputable proof of his practical ability and superior taste in architecture in the east front and colonnades of the Louvre, in regard to which edifice, Bernini (invited to Paris in 1665) and other eminent artists had been consulted. It appears to have been at the instance of his brother Charles that Perrault entered into the competition, in which he bore off the prize from his rivals; and his superiority on this occasion has by one of his biographers been attributed to his being unshackled by professional prejudices and habits. For some remarks on this deservedly celebrated façade, we refer to PARIS, p. 228; and shall here merely add, that notwithstanding its defects, which would now be avoided by one of far inferior talent, it is certainly a chef-d'œuvre of art for the same age which had admired a Maderno and a Borromini.

Perrault's other chief works are the Observatory (not particularly remarkable in point of design), and the Grotto, &c., at Versailles. The monument which, after the Louvre, would have best maintained his fame, the grand triumphal arch at the entrance of the Faubourg St. Antoine, was never executed, notwithstanding the foundations were built, and a temporary plaster model of the whole was erected. Besides his translation of Vitruvius, an enlarged edition of which appeared in 1684, he published an abridgement of it, 1674; a work 'On the Five Orders,' fol., 1683; 'Essais de Physique,' 4 vols. 4to., 1680; and a work on natural history; to which may be added a posthumous one (1700), giving an account of several machines of his invention. He died at Paris, Oct. 9th, 1688.

PERRAULT, CHARLES, brother to the preceding, born Jan. 12th, 1628, possessed also some talent for architecture, which procured for him the appointment of 'premier commis des bâtimens du roi.' He is now chiefly known as the author of the 'Parallèle des Anciens et Modernes,' Paris, 1690, wherein he exalts the latter at the expense of the former; and whatever may be thought of his judgment, he must be allowed to have shown no little courage when he ventured to express his preference of such writers as Scudéri and Chapelain to Homer. Such an extravagant opinion was hardly worth serious refutation, yet it was formally opposed by Boileau, in his 'Reflexions on Longinus,' intended as an answer to the 'Parallèle,' and this literary squabble was prolonged for some time. Of Perrault's work entitled 'Les Hommes Illustres qui ont paru en France pendant ce Siècle,' fol., the first volume appeared in 1696, the second in 1701. A collection of his miscellaneous pieces in verse and prose appeared at Paris in 1676, previously to which he had produced some other poems, which have long since been forgotten. One of his most interesting literary productions is his own Mémoires, first published at Avignon, in 1759. He died in 1703.

PERRAULT D'ARMACOURT, son of Charles Perrault, was also a writer, and is still remembered by his 'Contes des Fées,' which contain the nursery stories of Cinderella, &c., and may be considered as a classical work in that branch of literature.

PERROT, N. [ABLANCOURT.]

PERSE'A GRATI'SSIMA is the Avocado Pear of the West Indies, and receives its name in consequence of the resemblance in form between its fruit and that of a European pear. In reality it is a Lauraceous plant, allied to the Sweet Bay of our climate. The tree is about the size of an apple-tree; the leaves are oblong, veiny, and the flowers small, and of a greenish-yellow colour. The fruit is the size of a large pear, and is regarded as one of the best produced in the West India Islands. In the inside it is yellow, and contains a kernel enclosed in a soft rind. In taste it is said to resemble the peach, but to be much more agreeable, though not so sweet. It is sometimes eaten with pepper and salt, but more frequently with a little sugar and lime-juice. Three varieties are mentioned, the red, the purple, and the green.

Persea gratissima.

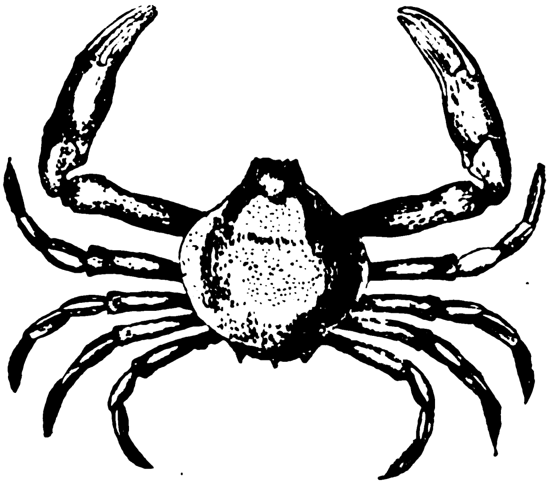
PERSE'PHONA, Dr. Leach's name for a genus of brachyurous crustaceans, placed by M. Milne Edwards among the tribe of *Leucosians*. [Oxystomes, vol. xvii., p. 110.)

Generic Character.—External and internal stems of the *exterior jaw-feet* gradually lessening from their base, the external stem being very obtuse at the extremity. *Carapace* rounded, depressed, and dilated on each side. *Front* rather advanced. Great joint of the abdomen of the male composed of three pieces soldered together. First pair of feet much stouter than the others, which have their two last joints compressed.

Example, *Persephona Latreillii.*

Description.—Anterior part of the shell gradually and obtusely dilated, covered with granulations; three equal recurved spines at its posterior part; arms tuberculous. Length two inches and a half.

Locality, unknown.



Persephona Latreillii.

PERSE'POLIS (Περσέπολις) is mentioned by Greek writers after the time of Alexander as the capital of Persia. The name however does not occur in Herodotus, Ctesias, Xenophon, or Nehemiah, who were well acquainted with the other principal cities of the Persian empire, and make frequent mention of Susa, Babylon, and Ecbatana. Their silence may be accounted for by the fact that Persepolis never appears to have been a place of residence for the Persian kings, though we must conclude, from the account of Arrian and other writers, that it was from the most antient times regarded as the capital of the empire. The kings of Persia appear to have been buried here or at Pasargadæ. There was at Persepolis a magnificent palace, which at the time of Alexander was full of immense treasures, which had accumulated there from the time of Cyrus. (Diod. Sic., xvii., 71; Strabo, xv., p. 729.) We know scarcely anything of the history of Persepolis. The palace of the Persian kings and a part of the city were burnt by Alexander (Arrian, iii. 18; Curt. v. 7; Strabo, xv., p. 729; Diod. Sic., xvii. 70); but it still continued to be a place of considerable importance after his time (Diod. Sic., xix. 22). We read of an attempt by Antiochus Epiphanes to plunder it, which did not succeed. (2 *Mac.*, ix. 1, 2.)

There has been considerable dispute respecting the Persian name of Persepolis. Oriental historians say that it was Istekhar or Estekhar (D'Herbelot, *Bibliothèque Orientale*), and many modern writers suppose that Pasargadæ and Persepolis are only different names for the same place, and that the latter word is the Greek translation of the former. There are however strong reasons for believing that they are distinct places. [Pasargadæ.]

Persepolis was situated in an extensive plain, near the union of the Araxes (*Bendemir*) and Cyrus (*Kur*). The situation appears to have been very healthy and favourable to longevity. Mr. Rich, when he visited the spot, heard of several persons who had attained the age of a hundred. (*Narrative of a Journey to Babylon and Persepolis*, p. [illegible].) The ruins of Persepolis, which are usually called by the inhabitants Tchil-Minar, that is, 'the forty pillars,' are described at great length in Sir R. K. Porter's 'Travels,' vol. i., p. 576, fol. [Persepolitan Architecture; Arrow-headed Characters.]

PERSEPOLITAN ARCHITECTURE. The remains of buildings on the site of Persepolis, or in its vicinity, are few and so imperfect as to render it impossible to judge of the style of architecture beyond a few particulars. It seems to have had much in common with that of Egypt, and yet to have differed materially from it in various respects. Of tombs and sepulchral chambers hewn out of the perpendicular face of rocks, there are several specimens at Naksh-i-Rustam; yet these bear little similarity to the subterranean or excavated catacombs of Egypt, which are generally of very great extent, and consist of one or more passages leading to different apartments; whereas these antient Persian excavations are very shallow, and consist chiefly of an architectural frontispiece or portico richly adorned with sculpture and other decorations. Such are those at Naksh-i-Rustam; also the tomb of Darius, the son of Hystaspes, at the foot of Mount Rachmed, near the river Bendemir, the antient Araxes. This monument has a portico of four columns, whose capitals have figures of the foreparts of animals projecting from their sides. There are also two rows of sculpture above the portico.

The present inhabitants call the remains of Persepolis itself Tak-Jamschid, or the residence of Jamschid (supposed by them to have been its founder); and by the Mohammedans, Tchil-Minar, or the Forty Columns, of which number however scarcely half are now remaining. These columns, and some other parts of the palace to which they belonged, stand upon an eminence or terrace formed by levelling the surface of a marble rock, and which extends upwards of 400 yards from north to south, and about [illegible] from east to west. Though it may be described as a parallelogram in its general shape, this platform is not perfectly regular in plan, being indented by projections and recesses which follow the sinuosities of the superficies of the rock itself; neither is it one uniform level throughout, those parts which were covered with buildings being somewhat elevated above the rest. The height above the plain from which the rock rises varies considerably in different places, in some being not more than 14 feet, and in others 40. On every side except the east, where it adjoins a hill forming a sort of screen or background to it, the platform is enclosed by walls or parapets constructed of large blocks of masonry; and that opposite the loftier ground to the east, the western (1425 feet in extent), may be considered the principal front, and accordingly here we find the entrance, not however in the centre, but about midway between that and the north-west angle. The ground is here somewhat more than 20 feet below the terrace, owing to which there is a considerable ascent, which is not formed by wide flights of steps in a direct line leading to the entrance, but by two [illegible], ramps or flights in contrary directions, which return to the upper landing-place. Facing this latter, but at a little distance from it, is a *propylon*, or lofty mass with a doorway, similar to those in Egyptian architecture.

little beyond it a second entrance of the same kind. Like the Egyptian, these propyla diminish upwards, and are crowned by a cavetto, or hollow cornice: they are also adorned with fanciful colossal figures of animals, partly in low and partly in high relief, sculptured on their sides, and among these monsters are some representing winged horses with human heads. It is probable that these propyla led into some enclosure serving as the chief or entrance court of the palace; but that cannot now be determined, nor in what manner the principal mass of building now remaining could have been made to display itself conspicuously from such an enclosure; because, instead of being on the east side facing the entrance, it lies on the south or right hand of the entrance, and in such manner as to extend more westward, consequently it would have been necessary to turn back to it in that direction from any court beyond the propyla. Neither is it certain whether this edifice was any part of the palace itself or actual residence, or only a temple belonging to it. The plan would seem to favour the latter supposition, because, from what can now be made out from it, this structure contains within, not a spacious hall suited for entertainments, but one filled with lines of columns in every direction (as is evident from the position of those now remaining), so as to form a number of aisles intersecting each other. Such a grove-like arrangement of numerous pillars is altogether unlike anything in Grecian architecture, and more in accordance with that of the Arabians, some of whose buildings, the mosque at Cordova for instance, are similarly filled with lines of columns. A similar dense disposition of pillars prevailed also among the Egyptians; and for an example of it among the latter people, we refer to the plan of the temple at Edfu [EGYPTIAN ARCHITECTURE, p. 316], where both the pronaos and vestibule are in the same manner *polystylar*, or filled with columns, although they occupy a smaller space, and are consequently not so numerous.

The columns at Persepolis are of grey marble, 5 feet 9 inches in diameter, and about 72 feet, or nearly thirteen diameters in height; therefore of very slender proportions, and so far very different from Egyptian columns. Neither do they otherwise resemble them, except in their dissimilarity from the Grecian orders and in the capriciousness of their decoration. Of some of these columns the shafts are ornamented with a kind of zigzag or vandyke pattern, after the manner of the fragment found near the Treasury of Atreus at Mycenæ; while others are fluted, but the channels are exceedingly narrow, being forty, or double the number of those of a Doric column. The bases and capitals are still more singular, both of them being very deep and of fanciful shape and outline. In fact the capitals are composed of so many divisions that the lowermost of them seem to belong as much to the upper part of the shaft as to the capital itself; or if all are included as parts of that member of the column, it must be reckoned at one-fifth of the entire height. Among their fanciful ornaments occur small scrolls, which some have thought to bear a resemblance to Ionic volutes, but it certainly requires a very strong imagination to detect the similarity, although a tolerable resemblance of an Italian Ionic capital may be seen in the drawing of a Persepolitan one by holding the latter sideways, so that the scrolls, which are there one above another, are brought into a horizontal direction. Other Persepolitan capitals have figures of unicorns or other animals projecting from them laterally beneath the epistylium.

Besides the building above mentioned, there are traces of various others behind it, on the south side: among the rest, the remains of two *polystylar* halls; but even including these, the plan would have been exceedingly limited and inadequate to the accommodation required for the court of a prince and a numerous retinue, unless the buildings originally extended themselves much beyond the actual ruins, and consisted of several stories. Eastward of the first described large hall is another very spacious one, perfectly square in plan, and with two entrances on each of its four sides, but without columns; it is therefore questionable whether it was not a court, or was else originally divided into separate rooms.

Even were these ruins in a more perfect state, they would not, as a solitary example, go very far towards elucidating the architectural style of the antient Persians. Some points of resemblance between it and Egyptian architecture have already been pointed out, namely, lofty square-beaded gateways, or propyla, terrace-like platforms, and polystylar apartments, in which the columns are arranged phalanx-wise, to which may be added the mode of decorating doors, and the practice of covering the entire surface of walls with figures or inscriptions, as is the case with the fronts of the terraces at Persepolis. Even the sculpture itself shows the state of that art to have been nearly the same as among the Egyptians, the drawing of the figures being rude and stiff, and they being nearly all represented in profile, without any attempt at grouping, while the clumsy expedient is adopted of indicating a king or chief personage by making such figure larger than the rest. It is not likely that all these circumstances of resemblance were merely casual coincidences; but neither is it possible to offer any hypothesis that would account satisfactorily for many striking points of disparity, particularly as regards both the proportions and decoration of columns, which, being the principal features in every style, would be those most likely to be copied, with more or less exactness, where any imitation was aimed at. Instead of this, the Persepolitan style appears to have been most licentious in regard to columns, and in this respect not only dissimilar from but greatly inferior in taste to the Egyptian. The sculptures of Persepolis, though of no value as works of art, serve to elucidate some passages in Greek and Roman-writers which relate to Persian affairs.

There are in the British Museum some specimens of Persian sculpture brought from Persepolis.

(Niebuhr, *Reisebeschreibung*, &c., ii. 121, &c., who has given a plan of the buildings and various drawings of the monuments and the reliefs; Ker Porter's *Travels*, vol. i., p. 576; Le Bruyn; Chardin; Morier; Hirt, *Baukunst*, &c.)

PERSEUS, son of Philip V., king of Macedonia, began at an early age to serve in his father's army, and distinguished himself by some successes against the barbarous nations which bordered on Macedonia. His younger brother Demetrius was carried away as a hostage by the consul Flamininius at the time of the peace between Rome and Philip, and after remaining several years at Rome, where he won the favour of the senate, was sent back to Macedonia. After a time he was again sent by his father to Rome, on a mission, in consequence of fresh disagreements which had sprung up between the two states. Demetrius succeeded in maintaining peace, but after his return to Macedonia, he was accused of ambitious designs, of aspiring to the crown, and of being in secret correspondence with Rome. Perseus, who was jealous of him, supported the charges, and Philip doomed his younger son to death, but not daring to have him openly executed, for fear of the Romans, he caused him to be poisoned. It is said that having discovered his innocence, his remorse and his indignation against Perseus hastened his death. Perseus ascended the throne in the year 179 B.C.

Perseus had been brought up by his father with sentiments of hatred against the Romans for the humiliation which they had inflicted upon Macedonia; however, he dissembled his feelings at the beginning of his reign, and confirmed the treaty existing between his father and the senate. But he soon began to prepare himself for war, and he endeavoured to form alliances with the states of Greece, and especially with the Achæans. The senate, hearing of this, sent legates to Macedonia to examine the state of affairs. Eumenes, king of Pergamus, a staunch ally of the Romans, was also closely watching the doings of Perseus, and he even went to Rome to report to the senate the hostile preparations of the Macedonians. On his return from Italy, as he was going to visit the temple of Delphi, an attempt was made upon his life by assassins hired by Perseus. Eumenes escaped, and the Roman senate declared Perseus to be the enemy of Rome, B.C. 172.

The consul P. Licinius was appointed to proceed with an army to Macedonia. At the same time commissioners were sent to Greece to exhort the allies of the Romans to join in the impending struggle against Perseus. Perseus had a conference with Q. Marcius, one of the commissioners, who granted him a truce, during which the king might send ambassadors to Rome to plead his cause. When the commissioners returned to Rome, they boasted of having deceived Perseus by holding out the hope of peace, in order to give time to Rome to prepare for war, whilst the delay could only be of disadvantage to the king, whose army was ready to take the field. Some of the older senators are said to have disapproved of this conduct as more deserving of the name of Punic than of Roman faith, but the majority of the senate, 'who cared more for what was advantageous than for what was honest,' supported the commissioners. (Livy, xlii. 47.) The legates of Perseus, after being heard by the senate, were dismissed without any satisfactory answer. Licinius, on arriving in Thessaly, 171 B.C., met the army of Perseus on the banks of the Peneus, but only partial engagements took place, in one of which the Roman cavalry was defeated, but in another it had the advantage, after which both armies went into winter-quarters. The following year, 170 B.C., seems to have been spent by both parties in preparations and desultory engagements. The consul Hostilius Mancinus made some attempts to enter Macedonia from Thessaly, but did not succeed. His legate Appius Claudius, being sent to Lychnidus in Illyria, attempted to surprise a town called Uscana, which was held by Perseus, but he was foiled, with the loss of most of his men. Meantime the exactions of the Roman prætors Lucretius and Hortensius had indisposed several of the cities of Greece against Rome, and produced a feeling favourable to Perseus. Those officers plundered Chalcis in Eubœa, a town allied to Rome, and allowed their soldiers to abuse the wives and children of the citizens. A citizen of Chalcis, who came to Rome to complain, said it had been found much safer to shut the gates against the Roman prætors than to receive them, for those who had shut their gates had escaped unhurt, whilst the allies of Rome were plundered. The people of Abdera, being required to furnish a heavy contingent of money and corn for the army, asked for a respite, but Hortensius entered the town, beheaded the principal citizens, and sold the rest as slaves. Envoys being sent to Rome by those unfortunate cities, the senate ordered the Abderites to be restored to liberty, and Lucretius, being summoned to Rome, was tried before the tribes, and fined a million of ases. (Livy, xliii. 4, 7, 8.) The Roman commissioners to the friendly states of Epirus, Ætolia, and Achæa, acted with less disregard to appearances, but with equal dishonesty. Those states, like all weak countries that submit to the dictates of a powerful stranger under the specious name of alliance, were divided into two parties: one willing to keep on friendly terms with Rome, but still mindful of their national honour and independence; the other servilely devoted to Rome. The leaders of the latter party sought the favour of the Roman consuls and prætors by accusing those whose views were not the same as their own, of being secret enemies of Rome. Some of the persons thus accused were summoned or in other words transported to Rome, to await the pleasure of the senate.

In the next year, 169 B.C., the new consul Q. Marcius came to take the command of the army against Perseus. He entered Macedonia unopposed, and took possession of the town of Dium, but finding it difficult to get supplies for his army, he withdrew to the frontiers of Thessaly, retaining possession however of the strong defile of Dium, which commanded the entrance of Macedonia on that side. On this occasion, Polybius, with others of his countrymen, being sent by the Achæans to offer their assistance to the consul, remained some time with the Roman army.

In the year 168 B.C., Paulus Æmilius was sent to command the army against Macedonia. He passed the mountains from Thessaly and advanced to Pydna, where he met Perseus with his army. The Romans found means to break through the Macedonian phalanx, and a frightful confusion and butchery followed, in which 20,000 Macedonians are said to have lost their lives. This single battle decided the fate of a powerful and antient kingdom; all Macedonia submitted to the Romans. Perseus fled, almost alone, without waiting for the end of the battle. He went first to Pella, the antient seat of the Macedonian kings, then to Amphipolis, and from thence to the island of Samothrace, whose asylum was considered inviolable. Thence he attempted to escape by sea to Thrace; but a Cretan master of a vessel, after having shipped part of his treasures, sailed away, leaving the king on the shore. The king's attendants having also forsaken him except one, Perseus, with his eldest son Philip, came out of the temple where he had taken refuge, and surrendered to the Romans. He was treated at first by Æmilius with considerate indulgence, but was obliged to parade the streets of Rome with his children, to grace the triumph of his conqueror. He was afterwards confined, by order of the senate, at Alba in the mountains of the Marsi, near the lake Fucinus, where he died in a few years. His son Philip also died at Alba. Another and a younger son is said to have become a scribe or writer to the muncipality of Alba.

PERSEUS (constellation). The mythological story of Perseus is well enough known: in the heavens the constellation is surrounded by Andromeda, Aries, Taurus, Auriga, Camelopardalus, and Cassiopeia. Of the two principal stars α and β (the latter of which is called Algol), the former is situated in the breast of the figure, the latter in the head of Medusa, which he carries in his left hand. The following are the principal stars;—

Character.	No. in Catalogue of		Magnitude.	Character.	No. in Catalogue of		Magnitude.
	Flamsteed, (Piazzi)	Astron. Society.			Flam. (Piazzi.)	Astron. Society.	
(p^1)	16	303	4	ε	45	433	3
τ	18	308	5	ξ	46	438	5
γ	23	329	3	e	48	452	5
ρ	25	334	4	μ	61	462	4
β	26	341	2½	b	(18)	467	5
κ	27	343	4½		(123)	400	4
α	33	365	2½	η	(179)*	299	5
σ	35	377	5		(236)	331	5
ψ	37	384	5		(253)	340	4
δ	39	393	3	ι	9	242	6
ν	41	399	4	θ	13	252	4
ζ	44	430	3				

PERSHORE. [WORCESTERSHIRE.]

PERSIA, or PERSIS (Πέρσις), called in the Old Testament Paras (פָּרַס), and by the Arabic and Persian writers Fars, or Farsistan, is used in two significations: first, it is applied to the country originally inhabited by the Persians, and secondly, to the various countries in Asia included in the Persian empire founded by Cyrus, which extended from the Mediterranean to the Indus, and from the Black Sea and the Caspian, to the Persian Gulf and the Indian Ocean.

Persis proper was bounded on the north and north-west by Media, from which it was separated by the mountain range known to the antients under the name of Parachoathras (Ptolem., vi. 4; Strabo, xi. 522), on the south by the Persian Gulf, on the east by Carmania, and on the west by Susiana, from which it was separated by rugged and inaccessible mountains. (Strabo, xv. 728.) The country included within these limits is, according to Chardin's estimate, as large as France. The southern part of it near the sea-coast is a sandy plain, almost uninhabitable on account of the heat and the pestilential winds which blow from the desert of Carmania. (Plin., xii. 20; Strabo, xv. 727.) But at a short distance from the coast the ground rises, and the interior of the country towards the north is intersected by numerous mountain-ranges. The soil upon these mountains is very poor and barren, and though there are some fertile valleys among them, they are generally fit only for the residence of nomadic shepherds. This part of Persia was the original seat of the conquerors of Asia, where they were inured to hardship and privation. In the inner part of the country however there are many well watered and fertile plains, in the largest of which Persepolis is situated. (Strabo, xv. 7[illegible]; Ptolem., vi. 4.)

The Persians were divided into several herds or tribes, of which the principal were the Pasargadæ, Maraphii, and Maspii, and of these the Pasargadæ were the noblest, the chief clan of which, called the Achæmenidæ, the royal family of Persia belonged. (Herod., i. 125.) In addition to these tribes, Herodotus mentions the Panthialæi, Derusiæi, and Germanii, as agricultural tribes; and the Daï, Mardi, Dropici, and Sagartii, as nomadic tribes.

Herodotus says (vii. 61) that the Persians were originally called Artæi; which word probably contains the same root as Arii, the original name of the Medes (Herod., vii. 62), and *Arya*, the word by which the followers of the Brahmanic religion are designated in Sanscrit. The same root occurs in Aria and Ariana, from the latter of which the modern Persian name Iran seems to be derived. [ARIANA.]

The only places of importance in Persis were PERSEPOLIS and PASARGADÆ, of which an account is given in separate articles.

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* This star is Flamsteed's 16, according to Mr. Baily.

PERSIA is called **IRAN** by the natives. The form and boundaries of the country to which this name is applied, are distinctly marked by nature. It lies between 25° and 40° N. lat. and 44° and 70° E. long., constituting an elevated table-land, surrounded by mountain-ranges, which mark the edges of the table-land, and separate it either from the sea or from the low countries which enclose it on the east, north, and west. On the south the table-land, or rather the ranges which enclose it, come close to the Persian Gulf and the Indian Sea. On the east of the table-land are the extensive plains which are watered by the river Sind, or Indus; and on the north the still more extensive plain which surrounds the lake of Aral, and extends to the eastern shores of the Caspian Sea. These desert plains are known to the natives by the name of Turan. A narrow and very low tract of land separates Iran from the Caspian Sea, and a somewhat more elevated and rather undulating plain divides it from the high range of Caucasus. Along the mountain-chains which form its western border, are the great plains drained by the Tigris and Euphrates. Thus the table-land of Iran is surrounded on all sides by lower countries, but it is connected with the mountain-ranges of Eastern Asia and Asia Minor by two chains. The chain which unites it with the Himalaya and Kuen-Luen mountains, in Eastern Asia, lies between 34° and 37° N. lat., and between 68° and 73° E. long., and is known by the name of Hindu Cush. At the most north-western extremity of Iran is Mount Ararat. From that high pinnacle a mountain-chain runs westward, and unites the table-land with the mountains of Asia Minor. This chain is called the Armenian Mountains.

The surface of the table-land of Iran, with the mountain-ranges enclosing it, according to a very rough estimate, may occupy an area of between 1,600,000 and 1,700,000 square miles, or about one-twelfth of the surface of Asia. The table-land is generally level, interspersed with low and rocky ridges of comparatively small extent, which are like islands or oases in the sandy sea which surrounds them. The level tracts, which occupy an immense space, and lie contiguous to one another, are either covered with loose sand, or sand impregnated with salt; but both these kinds of sand are nearly destitute of vegetation. Along the interior base of the mountain-ranges which extend along the edges of the table-land, there are large tracts the soil of which is generally fertile wherever there are means of irrigating the fields. However even in these tracts there are numerous ridges of rocks, which render cultivation always difficult, and frequently impossible.

This extensive country is at present divided into three independent states. The western half of it constitutes the present kingdom of Persia, or Iran, and the eastern is divided between the sovereigns of Afghanistan and Beloochistan. Of the two last-mentioned countries an account is found under their respective heads.

The modern kingdom of Persia extends between 25° and 40° N. lat., and from 44° to 62° 30′ E. long., and borders on the east on the kingdoms of Afghanistan and Beloochistan. The plains along the northern boundary are inhabited by several tribes of nomadic Turkomans as far west as the shores of the Caspian Sea, which constitutes the boundary-line on the north as far as 49° E. long., and washes it as far north as 38° 40′, where the line begins which separates Persia from Russia. This line commences on the shores of the Caspian Sea, at the mouth of the Astarah river, and runs along its course to its junction with the Kala Kishi; it then follows the course of this river to its source in the Talish Mountains. This range, which extends to the west of north, constitutes, as far as 39° N. lat., the boundary-line, which, farther north, passes to the Bala-rud river, and thence to the Aras river. The last-mentioned river separates Persia from Russia as far as the base of Mount Ararat, which is situated at the junction of the three empires of Russia, Turkey, and Persia. The western boundary line of Persia passes over the mountains of Kurdistan, which enclose the table-land of Iran on the west. North of 35°, the greater part of these mountain-ranges are subject to Turkey, the boundary-line between Turkey and Persia passing between the lakes of Van and Urumi or Urumiyeh; but south of that parallel, the whole of the mountain-system is now included within the territories of Persia, which, south of 33° N. lat., extend to the banks of the Tigris and Shat el Arab. According to a rough estimate, the surface of Persia is half a million of square miles, or considerably more than double the area of France. It includes the western half of the table-land of Iran, and also the low narrow tract which separates the table-land from the Caspian Sea, as well as a small portion of the low plain which lies to the west of the table-land on the banks of the Tigris.

Surface and Soil.—The following description of this country begins at the north-eastern angle, between 62° and 61° E. long., where the continuity of the mountain-range which constitutes the northern border of the table-land is interrupted by a wide break. Through this break the Heri-rud, or river of Herat, which rises within the table-land, finds its way to the wide plain of Turkestan, where it is joined on the right by the Thajen (Tedjen) and Murghab, and on the left by the Meshed river. East of this break the mountain-range runs uninterrupted, though with unequal elevation, eastward to the great mountain mass called the Hindu Cush. But west of the break, the mountains spread out into an elevated region, the general direction of which is south-east and north-west. In some places this mountain-region is 200 miles wide, but it grows much narrower between 57° and 54° E. long., where it approaches the shores of the Caspian Sea. This mountain-region, which descends rapidly towards the plains of Turkestan, but with a less rapid descent towards the south, is called the mountains of Khorasan, and is traversed by numerous ridges of hills, which run to the north of north-west on the northern edge of the region, but farther south, to the west of north-west, until the latter ridges decline to the west as they approach the Caspian Sea. The most elevated part of the region seems to be nearly in the middle, where the plains on which the ridges are based are perhaps near 3500 feet high, while the plains south of the mountain-region perhaps do not exceed 2500 feet in elevation. The ridges themselves are of moderate height, and seldom rise more than 1000 feet above their base. They are only covered with snow for one or two months in the year; and this circumstance, added to the want of rain and the general dryness of the atmosphere, renders them unfit for maintaining perpetual streams of water. The ridges themselves are rocky, and frequently steep, but of inconsiderable width, so that the longitudinal valleys which are enclosed by them are frequently 20 miles in width, and sometimes 100 miles long: such is the long valley which extends from Meshed on the south-east to Shirwan on the north-west. The declivities of the ridges are destitute of wood, except on the north side of the mountain region, called the Attak, where some trees occur, but they do not exhibit a vigorous growth. Though the rocky masses are generally without vegetation, some parts are covered with grass, and afford pasture during a great part of the year. The soil of the valleys, or rather plains, consists principally of gravel washed down from the rocky eminences, or of clay, which, when it has no moisture, is as barren as the rock itself. No kind of cultivation is possible without careful irrigation; but as water is scarce, only a very small portion of these plains can be cultivated. The numerous ruins of villages and towns in these plains show that a much greater portion of them was formerly under cultivation, and this change is chiefly if not entirely to be attributed to the continual predatory inroads of the wandering Turkomans, who inhabit the northern plains. The valleys are as destitute of trees as the mountains, except a few poplars or chinars (*Platanus orientalis*), which rise above the huts of the peasants, or the fruit-trees of the orchards, or perhaps a few other trees which have been planted on the margin of a watercourse.

Where the mountain-ranges approach the Caspian Sea and turn to the west, between 56° and 55° E. long., they probably occupy less than sixty miles in width, and their most elevated summits are not much higher than those of the ridges farther east. But west of 55° E. long., or west of the mountain pass of Bastam, they incline gradually a little to the south, and proceed in that direction to 52° E. long., where they again gradually decline to the north of west, until they terminate on the banks of the river Sefid-rud, at the pass of Rudbar. This portion of the range, which has received the name of the Elburz Mountains, forms a segment of a circle, the concave side of which is turned to the Caspian Sea. Near the point where the change in the direction of the range takes place is Mount Demavend, which rises to the height of 14,700 feet. Its declivities show many unequivocal signs of its having once been an active volcano. That portion of the Elburz Mountains which lies east of Mount Demavend, though considerably higher than the mountains farther east, probably nowhere exceeds 7000 or

8000 feet in height above the sea-level: the snow disappears from its summits about the beginning of May. The mountainous portion of the range may occupy a width of about 15 or 20 miles, but the lower hills which skirt it on the south and north increase its breadth to 50 or 60 miles. That part of the Elburz Mountains which lies west of Mount Demávend is much higher, several of the ridges being covered with snow even in the beginning of June. It consists of three elevated ranges, which, together with two valleys, cover a space about 30 miles wide, and on both sides are skirted by a belt of hills. Between the northern belt of hills and the shores of the Caspian Sea is a narrow strip of low land, called the Plain of Mazanderan and Ghilan.

The tract of country which extends along the southern side of the Elburz Mountains, and between it and the desert in the interior of Iran, may vary between 20 and 30 miles in width. In its eastern districts, where the adjacent mountains do not rise to a great height, it is ill provided with water, and resembles in soil and nearly every other particular the valleys of the mountain-region of Khorasan; but west of 53°, in the vicinity of Mount Demávend, where the mountains rise to a greater elevation, and are covered with snow more than half the year, numerous small rivers descend from them, and the valleys through which they flow are well cultivated. A change in the fertility of the country however occurs west of 51° E. long., where the most southern of the three ranges, composing the Elburz Mountains, does not rise so high as the two others which lie farther north; and being covered with snow only a few months in the year, it can only feed a small number of rivers. Irrigation is consequently very limited, and an undulating, stony, barren plain generally occupies the tract between the mountains and the desert. But the two valleys, which are enclosed by the three chains, and drained by the two branches of the Shahrud, called the Shahrud of Talkán and the Shahrud of Alamút, are very well watered, carefully cultivated, and populous. Each of these valleys is about 30 miles long, and they vary in width from two to three miles. By their union the Shahrud river is formed, which falls into the Sefid-rud above the pass of Rudbar; and the valley in which it flows for about 30 miles is wide and fertile. The northern declivities of the mountains are without wood.

The Elburz Mountains do not descend with a steep declivity towards the north, but are skirted by a hilly tract varying from twenty to thirty miles in width. The hills sink lower as they advance farther north and approach the shores of the Caspian Sea. The valleys between them are narrow; they may more properly be called ravines, scooped out by the torrents which descend from the range, and which, during the rains, run with inconceivable force. Up to a great elevation above the sea they are covered with thick woods of oak, beech, elm, walnut, and brushwood, with which cypresses, cedars, and box-trees are intermingled. On the gentle declivities of these hills, especially those which are some thousand feet above the sea-level, wheat and barley are cultivated to a considerable extent, and others serve as pasture-ground for cattle. Dairies are numerous, and well attended to.

The narrow tract of level ground which surrounds the southern extremity of the Caspian Sea, and goes under the name of the Plain of Ghilan and Mazanderan, extends from the mouth of the river Gourgan, which falls into the most south-eastern angle of the sea, to the mouth of the river Astarah. This tract considerably exceeds 300 miles in length; the width varies greatly, being much less to the west than to the east. West of 51° E. long. it is perhaps in no part more than four or five miles across, but it widens considerably farther east: the greatest breadth occurs between 52° and 53° W. long., where it is 30 miles wide in the meridian of the towns of Amol and Balfrush. Farther east it again grows narrower. This low tract is very little elevated above the level of the Caspian Sea, and as this sea, according to the latest measurement, is a hundred feet below the level of the Black Sea, it is evident that the plain of Ghilan and Mazanderan is below the sea-level. This circumstance must be considered one of the causes which give to this plain such an extraordinary climate, as is found nowhere else without the torrid zone, though this region is more than 14 degrees from the tropic of Cancer. The other causes which operate in producing this extraordinary phenomenon are the great expanse of water to the north, and the high range of mountains which enclose it on the south. Like the intertropical countries, this plain has a rainy and a dry season. Heavy gales commence in the month of September from the north and north-east, which drive the clouds against the mountain-wall of the Elburz, and the rain descends in torrents, accompanied by terrific thunder-storms. In a few hours large tracts of land are laid under water, and in the course of a few days all the small rivers which descend from the range inundate the adjacent country, and the roads are converted into almost impassable torrents. In the plain the rain continues to the middle of January; but on the slopes of the mountains it is converted into snow about the beginning of November. The water in the rivers is thus quickly diminished in quantity, and as their courses are rapid, the country soon becomes dry again. The quantity of snow which then falls in the higher parts is enormous. It is stated to rise in many places from one to two fathoms, and to carry away houses and villages. The mountaineers leave their abodes and retire to the plain. The melting of the snow in February and March does not produce inundations, owing to the short course of the rivers and the gentle slope of the hills. The spring, from March to May, is the most pleasant and healthy season. In summer, though rains are less frequent, the air contains much moisture, and the plain is almost continually enveloped in vapour and fogs, which give rise to several kinds of fevers and other dangerous diseases. The heat in summer is frequently oppressive. It is observed that a hot southerly wind sometimes springs up during the winter season, which instantly changes the temperature in a most remarkable manner, and dries wood and other inflammable substances to such a degree as to render them liable to take fire from the slightest spark. It sometimes lasts only a quarter of an hour, but generally twenty-four hours, and is immediately followed by a gale from the north-east, which brings snow and rain. This southerly wind is called by the natives the Bagdad wind. It is difficult to explain how it acquires such a degree of heat and dryness, as it blows over a country covered with snow.

This extraordinary climate produces a luxuriance of vegetation which is rarely met with even between the tropics, and is only exceeded by that of the coasts of Malabar and Chittagong, and of some islands of the Indian archipelago. The swampy tracts along the shores of the Caspian Sea are overgrown with saline plants and canes, which are extensively employed in building and for domestic purposes. At a short distance from the shores begin the forests, which cover the whole plain, and extend to a considerable elevation up the slopes of the hills. These forests contain numerous small villages, surrounded by extensive orchards and plantations of mulberry-trees and rice-fields, rice being the only grain which is cultivated. The vines frequently occupy large spaces, as well as the orchards, which produce figs, peaches, apricots, pears, apples, plums, and cherries; the pomegranate tree grows wild. It is however to be observed that in the lower and western portion of the plain which constitutes the province of Ghilan, the sugar-cane and orange-trees, which abound in Mazanderan, do not succeed, and are only cultivated as ornamental plants; cotton also does not grow, and the fruits have an acid and harsh taste. The sugar-plantations in Mazanderan are very extensive, and cotton is one of the principal objects of cultivation. In Ghilan the peasants are mostly occupied with the rearing of silk and the cultivation of rice. The plain of Mazanderan is somewhat more elevated than that of Ghilan, and its climate less humid, which evidently arises from the smaller elevation of the Elburz mountains at the back of Mazanderan than at the back of Ghilan, and the greater breadth of the plain.

The western portion of the plain of Ghilan separates the Caspian Sea from the table-land of Azerbijan, which constitutes the most northern portion of the great table-land of Iran, and lies between 36° and 40° N. lat. and between [illegible] and 49° E. long. A small portion of it, north of the river Aras, belongs to Russia. The general elevation of this table-land is 4500 feet above the sea-level, and perhaps nowhere sinks lower, though in many parts it rises higher, and in some parts to 6000 feet. Along its eastern side extends a mountain-range, which begins on the banks of the Sefid-rud, opposite the termination of the Elburz Mountains at the pass of Rudbar, and extends nearly parallel to the shores of the Caspian Sea in a north-west and northern direction to the banks of the Aras, where it terminates not far from that river on the boundary-line between Russia and Persia. This range, which is uninterrupted, is about 150 miles long, and about 20 miles wide. It is called the Massula Mountains. It rises from 6000 to 7000 feet above the sea-level, or about 2000 feet above the table-land. To the west of it, and at a distance varying from 6 to 30 miles from the Massula Mountains, is another and apparently higher range, which, even at the mountain-passes, exceeds 8000 feet of elevation; and in Mount Sevellan (north of 38° N. lat.) rises to about 12,000 feet: but this range is broken by the river Sefid-rud below Miana, and does not extend far north of Mount Sevellan. The table-land of Azerbijan is bounded on the west by the numerous ranges of the Kurdistan Mountains. The surface of the table-land in general is hilly, but the hills do not rise into mountains, except between 36° 30′ and 37° 30′ N. lat., where several high ranges occur, as the mountains of Kibleh and the Kalifan Koh, which perhaps rise to 2000 feet above their base. This tract seems to contain the highest portion of the table-land, and the ranges of hills form a connection between the Kurdistan Mountains and the Massula Mountains. The levels between these ranges are not in general extensive enough to be called plains, though in some parts they are several miles wide. But farther north, several of them from extensive plains, among which that surrounding the lake of Urumiyeh is by far the largest. Though in several places traversed by narrow and low ranges of hills, which terminate at a small distance from the shores of the lake, the plain extends in general from 20 to 30 miles from it, and at Tabriz even 50 miles. From the hills and mountains which enclose the basin of the lake an immense number of perennial streams descend, and are much used for irrigation. The rice-fields are extensive, and produce rich crops: the meadows are equally large, and horses, buffaloes, cows, and sheep are abundant on the pasture-grounds. But the greatest wealth of this plain consists in its large orchards, which yield abundance of peaches, nectarines, apricots, plums of all sorts, cherries, pears, apples, and grapes. There are also plantations of poplar and chinar, but the mountains and hills are generally devoid of wood. In the other plains, which are much less in extent, and have not the advantage of abundant water, the cultivation is limited, and they are chiefly used as pasture-grounds by the nomadic tribes. The climate of this table-land is cold in winter, but very temperate in summer. During several of the winter months it is covered with snow, and the cold is sometimes very intense, except on the plain around lake Urumiyeh, where the winters seem not to differ much from those of Northern Italy. The royal family of Persia abandon the town of Teheran in summer, and retire to Sultaniyah, in the southern districts of the table-land.

The mountains of Kurdistan occupy a broad belt of country along the western edge of the table-land of Iran. Mount Ararat may be considered as standing at the northern extremity of the mountains of Kurdistan. Its summit is 17,310 feet above the sea level, and it is the highest mountain in western Asia, or to the west of the Hindu-Coosh. The plain which extends along its northern base, and which attains an elevation of about 5500 feet above the sea level, separates it from the mountains which enclose the Black Sea on the south and east. From its southern base mountains branch off to the south and south-west, which enclose the lake of Van, and extend considerably in width, so that near [illegible]° N. lat., the whole country between the plains of Urumiyeh and the river Tigris is occupied by mountain-ridges and valleys, a space extending about 180 miles from west to east. The ranges which enclose the lake of Van seem to be the most elevated part of the Kurdistan mountains, the summits of Supan Tagh, Nimrud Tagh, Argerosh Tagh, and idesh Tagh rising above the snow-line. The mountain region extends from the lake in a south-eastern direction, and does not seem to decrease in width until it approaches [illegible]° N. lat., where it is probably not much more than 100 miles wide. Farther south it grows still narrower, and south of 35° it is hardly more than 70 or 80 miles wide, a breadth which it preserves to its termination, which may be fixed in 30° N. lat., where the mountains of Farsistan begin. The last-mentioned range may be considered as the continuation of the mountains of Kurdistan. The northern portion of this extensive mountain region, and as far south as 35° N. lat., is nominally subject to the Turkish emperor; but the nomadic tribes which inhabit it are independent under their hereditary chiefs, who frequently make predatory excursions into the neighbouring countries. This portion, with the exception of the road which leads from Tabriz, in Persia, to Van, and thence to Diarbekr, has seldom been visited by European travellers. It seems that the whole is almost entirely occupied by mountain-ranges, and that the valleys are narrow, but there are excellent pasture-grounds on the declivities of the mountains. Some summits appear to attain a great elevation, especially Mount Jawar, near 37° N. lat., nearly in the centre of the region. That portion of the Kurdistan mountains which lies south of 35° N. lat., and is subject to Persia, has lately been visited by many of our countrymen. The central portion of this region consists of a succession of mountains and narrow valleys, but towards its eastern and western edges there are wide valleys, or rather plains, a part of which is under cultivation, though the larger portion is generally used as pasture-ground. The mountains differ from those which surround the table-land of Iran, especially in their declivities being wooded with oak, which, near the base of the mountains, grows to a large tree, but higher up is stunted. The plains and valleys of this region probably occupy one-third of the surface. The ridges, frequently four, five, or even six in number, run in the direction of the whole range, and are frequently united by transverse ridges. But there are also several valleys which run across the ranges, as is evident from the courses of the rivers; for nearly all those rivers which join the Tigris south of 30° N. lat., and traverse this mountain region, do not rise within the range, but to the east of it, on the plains of the table-land of Iran, such as the Great Zab, the Diáyálah, and the Kerkhah. Though several summits and ridges attain a great elevation, being for nine or ten months covered with snow, only two summits rise above the snow-line: one of them is situated on the most western ridge, called Kebir Koh, near 33° 15′ N. lat., and the other in the ridge, called Koh Mungasht, near 31° 25′ N. lat.

That part of the great plain traversed by the Euphrates and Tigris, which belongs to Persia, lies between the mountains of Kurdistan, and the banks of the Tigris and Shat el Arab. It is about 100 miles long, and, on an average, 30 miles wide. The lower portion of it, which lies along the great river, and comprehends nearly one-half of the country, is swampy and uninhabited, owing to the badness of the air, and the difficulty of draining the ground. About fifteen miles from the banks of the river, the country is considerably higher, but as the soil is composed partly of sand and partly of a hard clay, it cannot be cultivated, except along the banks of the rivers, and even there cultivation is very limited. The greater part of the country is a waste, which does not yield pasture, except for camels. This more elevated tract is called Chad, or Kaaban.

The country which lies east of the Kurdistan mountains, and between them and the Kuweer, or Salt Desert, belongs to the table-land of Iran. Its general elevation above the sea in the southern districts exceeds 4000 feet, and rises in some parts to 6000 feet; but north of Ispahan it sinks down to 2500 feet, and in some places even lower. It is a plain traversed by numerous ridges of rocky hills, which generally run from west to east, and sink gradually into the desert farther east. Few of these hills are more than 1000 feet above their base, and generally not half so much. The valleys are open and wide, in some parts exceeding ten or fifteen miles in width; they are also very long. Here too, as in most places on the table-land of Iran, cultivation is limited for want of water. As the eastern ridge of the Kurdistan mountains does not rise high enough to be covered with snow for many months, the rivers which descend from them are scarcely provided with water during a great part of the year; and the little that they furnish is absorbed in irrigation. The valleys are consequently, for the most part, uncultivated, except in the vicinity of the villages, and these villages only occur at great distances from one another. It is however certain that a much greater portion of these valleys was formerly under cultivation, and that the decrease of agriculture in these districts must be ascribed to an oppressive government and the incursions of the nomadic tribes which are in possession of the mountains of Kurdistan.

The mountain region of Farsistan and Kerman occupies the whole of Persia south of 30° N. lat., from the mouth of the river Tab to Cape Jask (from 50° to 58° E. long.), a distance nearly 500 miles in length, and nearly 200 miles in average width. On the south it is washed by the Persian Gulf, and on the north it borders on that part of the great desert which is called the desert of Kerman. Along the shores of the gulf is a low and sandy tract, varying in width from 20 to 30 miles, the soil of which is impregnated with salt. It has a very hot dry climate, and produces nothing but dates. The natives call it *Dushtistan* or *Gurmsir*, that is, the warm region. No river falls into the Persian Gulf which is navigable, even for small boats, more than a few miles inland. It is asserted that the Gurmsir is slowly increasing in width by the retiring of the sea. At the back of this low tract the country rises in steep and bare rocks to the height of mountains, and constitutes an elevated region which extends more than 100 miles inland, where it stretches out in a plain traversed by low rocky ridges running east and west. About 50 miles from the sea, the lowest part of the mountainous tract is about 2500 feet above the sea-level, but where it approaches the plain it attains the height of 4000 feet. This mountainous region is called *Sirhud* (the cold country), in opposition to Gurmsir. In its northern districts, where it is connected with the mountains of Kurdistan, the rocky ridges, which traverse the surface longitudinally from west to east, rise to 7000 or 8000 feet, and in these parts they are partially wooded. But south of 29° N. lat. they do not appear to attain so great an elevation, rising probably only from 1000 to 2000 feet above their base, which in many places cannot attain a great elevation above the sea, as the valleys enclosed by the ridges produce the date. The ridges, though generally of inconsiderable width, are numerous, and the valleys are narrow, except towards the north, where they are from 15 to 20 miles across. The mountains are barren and destitute of vegetation, but the valleys are rich in fruits, and even grain, where they can be irrigated. The plain which extends along the northern side of the mountain region, and which is from 60 to 100 miles in width, has a soil strongly impregnated with salt, and contains several smaller salt lakes, besides the large salt lake of Bakhtegan. It would form a portion of the great desert, if it were not divided from it by a nearly continuous series of oases, which stretch east and west through it, between 29° and 30° N. lat., and which are enclosed on the north and south by two low ridges of rocky hills. This narrow fertile tract, called the *Nurmanshîr*, produces some grain, but it is particularly rich in several kinds of fruit, which attain great perfection.

Having surveyed the countries which surround the Great Desert of Iran on the north, west, and south, we shall notice the desert itself, as far as it is included within the boundary of Persia. The desert has its greatest width on the eastern border of Persia. Between the Nurmanshîr and the town of Herat it is more than 350 miles across. Pottinger says that from the mountains of Beloochistan, which between 60° and 62° E. long. form an extensive mountain region which advances as far as 31° N. lat., a narrow though at intervals very lofty ridge branches off in a northern direction, and extends, between 59° and 60° E. long., so far to the north that it seems to be united to the Khorasan Mountains to the westward of Herat. This ridge divides the sandy desert of Seistan from the salt desert of Persia, and in or near it the town of Khubbee seems to be situated, which is said to be at an equal distance from the Nurmanshîr and the town of Herat. Farther west the desert is not so wide, but near 55° E. long. it is probably still 250 miles across. From 55° E. long. it narrows more rapidly, so that at its western extremity, which occurs between 50° and 49° E. long., south of the town of Casbin, it hardly exceeds 30 or 40 miles in width. The desert is called by the Persians Kuweer. 'The nature of this desert,' says Fraser, 'varies in different places. In some the surface is dry, and even produces a few of those plants which love a salt soil; in others we find a crackling crust of earth, covered only with a saline efflorescence. A considerable portion is marshy, and during winter the melting of the snow and the increase of the torrents occasion an accumulation of water in the low parts. In the hot months much of this is evaporated, and leaves behind a quantity of salt in the form of cakes upon a bed of mud. In certain spots sand predominates, either in the shape of heavy plains or wavelike hillocks, easily drifted by the wind, and sometimes so light and impalpable as to prove extremely dangerous to travellers, who are not unfrequently buried in its heaps.' In several parts of this desert rocks rise abruptly, though in general only to a moderate elevation. These rocks usually form short ridges, and serve only as a place of refuge for the robbers, with whom the desert is infested along the roads. In several places however the rocks extend over several square miles, and contain between them small plains or valleys, in which water is found for the greater part of the year, and which are cultivable and inhabited. They thus constitute extensive oases. The largest of these oases form a series across the desert between Herat and Ispahan, extending from the first-mentioned town westward to Tubbus, from Tubbus southward to Yezd, and from Yezd westward to Ispahan. The towns of Tubbus and Yezd are situated in the most extensive of these oases. The smaller oases, which are traversed by the road that connects these towns, are generally 20 or 30 miles distant from each other, and in some places the distance is still greater.

Rivers and Lakes.—The table-land of Iran, together with the mountain regions which surround it on the north and south, is very sparingly watered. The southern mountain-ranges are too bare and also too low to attract sufficient moisture to form perennial streams, except in a few places. The northern mountains give rise to a much greater number of watercourses; but as soon as they enter the plain, and sometimes before, the small volume of water which they bring down during the greater part of the year is absorbed in irrigation, and only a few of these streams reach the desert, where they are lost in the dry and thirsty soil. Only those parts of Persia which are included in the plains of Ghilan and Mazanderan, in the table-land of Azerbijan, and in the mountains of Kurdistan, are well watered. The rivers of Ghilan and Mazanderan have a short course, but they are usually navigable for some miles from their mouths, where the woods on their banks do not form an impediment. The most considerable river in the table-land of Azerbijan is the Sefid-rud (or White River), which is also known and marked on our maps by the Turkish name of Kizil Uzen or Ozien. It rises within the mountains of Kurdistan, south of 36° N. lat., and traverses the most mountainous portion of the table-land of Azerbijan; it runs by a very circuitous course, first east-north-east for about 100 miles, and then about the same distance northward; when near 37° 30′ N. lat., it breaks through the western chain of the mountains of Massula, and turns to the south-east, in which direction it flows upwards of 80 miles, draining the valley between the two ranges of the Massula mountains. When it approaches the western extremity of the Elburz range, it is joined from the east by the river Shahrud, which drains the valleys of the western portion of the Elburz mountains, and runs about 100 miles. After its junction with this river, the Sefid-rud flows for about 30 miles in the narrow valley which separates the Elburz mountains from the eastern Massula range, and enters the plain of Ghilan, through which it flows into the Caspian Sea. The whole course of the Sefid-rud may be about 350 miles. On the table-land of Azerbijan the bed is generally many hundred feet, and sometimes a thousand feet, below the adjacent country. Thus it cannot be used for irrigation, and though the banks are less elevated above the pass of Rudbar, still the waters can nowhere be used to fertilise the country. In the plain of Ghilan the current is not rapid, but the river is not navigated, there being no place of any importance on its banks, which are very low and swampy. Two rivers, each running about 100 miles, fall into the lake of Urumiyeh, the Aji, which runs some distance north of Tabriz, and the Iaghâtu, which falls into the lake not far from the most south-eastern angle. Both are extensively used to irrigate the valleys through which they flow, and also the plain of Urumiyeh. The rivers which drain the mountains of Kurdistan and its numerous valleys are not navigable within the mountains, as their course is frequently broken by rapids and cataracts; and where they enter the plain, they are not navigated, the adjacent country being nearly uninhabited. Three of these rivers run between 200 and 400 miles: the Diáyâlah, which joins the Tigris below Bagdad; the Kerkhah, which falls into the Shat el Arab a few miles below Kornah; and the Karoon or Kuran, which joins the same river at the point near its mouth where it begins to divide into numerous branches.

As a great part of the soil of Persia is impregnated with salt, the few lakes which occur are salt also, except in Ghilan and Mazanderan, where there are several small lakes of fresh water. The most considerable of the lakes of Persia is that of Urumiyeh or Shahee (called Spauta by Shahed, which is more than 80 miles long, and about a third of that distance in extreme breadth. The greatest depth of the water is four fathoms, and the average depth about two fathoms; but the shores shelve so gradually, that this depth is rarely attained within two miles of the land. The water is much salter than that of the ocean. It is stated that its specific gravity is 1·165, while that of the Atlantic near the equator is 1·028, and that of the Baltic only 1·0049. A vessel of 100 tons burden, when loaded, is said not to draw more than from 2 to 3 feet. A gale of wind raises the waves only a few feet, and as soon as the storm has passed, they subside in a few minutes. It contains no fish, but the smaller classes of zoophytes are found in considerable quantity. The lake receives a great number of rivers, some of which are considerable, as the Aji and Jaghatu, but it has no outlet. The mountain region of Farsistan contains the salt lake formerly called Bakhtegan, but now Deryá-e-Niriz, or the Lake of Niriz. This lake has no outlet, and the country on its shores is without vegetation and uninhabited. [Bakhtegan.]

Climate.—The climate of the plain of Ghilan and Mazanderan has already been described. That of the Ghermsir, or the low and sandy tract along the Persian Gulf, is distinguished by its great heat and dryness, and is therefore the country most suitable to the growth of date-trees, which only bear valuable fruit where these two circumstances concur. It is extremely unhealthy during the summer heat, and is then almost entirely abandoned by the inhabitants, who retire to the adjacent mountains. In the interior of the table-land the climate is very hot in summer, but cold in winter. In summer however the air is dry and the sky cloudless. In winter it is not so dry, and a good deal of snow falls, not however sufficient to render the dry and sandy soil fit for maintaining constant vegetation. The quantity of snow which falls on and near the mountain regions appears to be much greater than that which falls in the centre of the table-land; and this probably is one of the principal reasons why the former exhibit a considerable degree of fertility, especially where the vegetation can be supported by irrigation; while the central part of the table-land is a desert, and the oases within this desert are more fit for plantations of fruit-trees than for the cultivation of grain. *Fraser* observes that about the end of November he found the whole plain surrounding Teheran, which is near the most northern edge of the table-land and not far from the foot of the Elburz range, covered with snow; and at the arrival of Morier at Teheran, about the middle of March, there was still ice. The month of April is cold, and northern winds then prevail. As these winds come from the mountains, which are then entirely covered with snow, they are very cold. The mild weather does not commence before the end of April, when the transition from cold to heat is very rapid. In this season the thermometer at sunrise stands between 51° and 55°, but at noon it rises to 70°, and in the afternoon a very hot south-eastern wind generally blows, which renders the heat in the streets nearly insupportable. On the 19th of April the thermometer rose to 82°. The climate of Teheran during the summer is subject to sudden though not great changes, which may probably be ascribed to the vicinity of the mountains. The climate is much more regular and constant in the other mountain regions.

Productions.—Agriculture is well understood and carefully attended to, as is evident from the means of irrigation employed, and especially the subterraneous aqueducts. But extensive tracts, which were formerly under cultivation, are now a desert, or serve only as pasture-ground, owing to the predatory incursions of the neighbouring wandering tribes. In other tracts, which are cultivable, grain is not raised, but they are kept in their natural state as pasture-ground for the Ilyats, or wandering tribes who live within the boundaries of the empire.

Rice, wheat, and barley are the most usual crops, but there are also millet (*Holcus sorghum*), maize, lel, or mashmung, dal, a species of vetch, and several kinds of beans and pease; cotton, indigo, sugar, tobacco, and madder are raised in many places, but especially in Mazanderan. The fruit-trees are managed with great care and skill, and many places are distinguished by their excellent fruit, which furnishes a considerable article of internal trade. The date grows only in the Ghermsir and some of the lower valleys in the mountains of Kerman; but other fruits grow in most places, and more especially in the oases in the middle of the desert. These fruits are apricots, peaches, nectarines, plums, apples, pears, quinces, figs, pomegranates, mulberries, currants, cherries, almonds, walnuts, and pistachio-nuts. The vine plantations are very extensive, though wine is made only in a few places by the Christians. The melons of Persia are distinguished by their size and flavour. The chief culinary vegetables are turnips, carrots, cabbages, lettuces, cauliflowers, radishes, celery, onions, garlic, parsley, and cucumbers. Forest-trees do not occur, except on the northern declivity of the Elburz mountains. The oak, which covers large tracts of the mountains of Kurdistan, does not grow to the size of a timber-tree. One of the most remarkable vegetable productions of Persia is the plant from which assafœtida is obtained. The poppies which produce opium are cultivated all over the table-land, and in many places saffron also is cultivated.

The domestic animals of Persia are camels, horses, asses, mules, black cattle, buffaloes, sheep, and goats. There are three sorts of camels in Persia; those with one hump, those with two, and a third produced by the union of these varieties; the last are preferred on account of their strength, docility, and patience. They carry from 700 to 1100 lbs. English. The Persian horses are noted for their beauty, strength, and speed, especially those of the Turkoman tribes. The race has been much improved by crossing with Arabian horses. It is hardly possible to conceive what journeys they are able to perform. The finest horses will fetch from 80*l.* to 100*l.* Even the common horses are good and strong, and a kind of pony, called *yaboo*, is much esteemed for strength and endurance. Asses are numerous, and some of them of superior size and description. Mules are used for the transport of goods more than any other animals; they are very strong, and usually carry about three cwt. The black cattle of the plain of Mazanderan are distinguished by size and beauty, and they have the Indian hump. Sheep are very numerous in all the parts possessed by the nomadic tribes; they are principally of the fat-tailed kind.

Though Persia, owing to the want of forests and the barrenness of the soil, is not largely stocked with wild animals, there is a great variety in the different parts. The lion is found on the plains along the Tigris, in Farsistan, and some other places. [Lion.] Leopards, cheetahs or hunting leopards, tiger-cats, lynxes, and bears, are more numerous. Hyænas, wolves, jackals, and foxes abound. Antelopes are numerous, and several sorts of deer are found. The wild ass (onager), called by the natives *gour khur*, is not often met with, but it is found over all the plains and rocky regions of the country, particularly in the deserts of Khorasan and the extensive valleys of Farsistan and Irak Ajemi. Wild boars, porcupines, and hares are common. Among the most remarkable wild animals are the *argali*, or mountain-sheep, and the *boz* or *pazan*, or mountain-goat. Birds are numerous only in a few places. Pheasants inhabit the plain which surrounds the south-eastern corner of the Caspian Sea; and bustards, partridges, desert-partridges, herons, wild ducks, and pelicans occur in many places. Blackbirds, thrushes, and nightingales are frequently heard in the underwood of the plains of Ghilan and Mazanderan, and in the thickets of roses which embellish every garden. Fish abounds only in the Persian Gulf and the Caspian Sea. Sturgeons and sterlets in great numbers ascend the small rivers which fall into the Caspian Sea, though not in such shoals as in the Volga. As the Persians themselves are not fond of fish, they have permitted the Russian fishermen to establish themselves near the mouths of these rivers, where they prepare caviar and isinglass, but the body of the fish is thrown away. Locusts frequently lay waste extensive tracts of country. Bees are common in many places, and much honey is collected. The silkworm furnishes the principal article of commerce in the plains of Ghilan and Mazanderan, but it is also reared in several other places.

Iron is abundant in many places, but it is not much worked. Lead mines are worked in some districts on the table-land of Azerbijan, and in Farsistan and Kerman. Copper has been discovered in Azerbijan and other places. Antimony is also found, but it is little used. Rock-salt is plentiful, and great tracts of the plain are covered with salt incrustations. Several kinds of bitumen are met with in some places, among which is naphtha and the celebrated momy or mummy, which is only collected in Farsistan, in the vicinity of the town of Darab or Darabgherd.

Inhabitants.—The population of Persia is differently estimated. Some think that it hardly exceeds seven millions, but others increase it to fifteen millions. It consists of a great number of nations, who speak different languages; but all of them belong to the Caucasian race. Many of these nations still adhere to a wandering life; it is even said that one-fourth of the population consists of nomadic communities, who form almost a distinct class from the nature of their habits and their modes of gaining a livelihood. That portion of the population which has fixed abodes consists of Persians and Parsees, of Armenians and Arabians.

The Persians, who are distinguished among the nations of Western Asia by the politeness of their manners and the degree of scientific knowledge which they have acquired, constitute the bulk of the population, and are merchants, agriculturists, and manufacturers. The number of the Parsees is small; and they appear to be numerous only in the oasis of Yezd. Their language differs considerably from that of the Persians; they are not Mohammedans, but adhere to the religion of Zoroaster, as it is contained in the Zend Avesta, and adore fire as the symbol of the divinity. They are distinguished by the purity of their life and their honesty in all transactions, and occupy themselves mostly with agriculture and the raising of fruits. Many of these fire-worshippers, when persecuted by the Mohammedans after the conquest of their country by the Caliph Omar (A.D. 642), left their homes and emigrated to India, where numerous communities still exist at Surat and Bombay. In India they are merchants, and highly esteemed for their honesty. The Armenians live in all the great towns, where they are merchants: they also cultivate the ground, and are particularly numerous in the western districts of the table-land of Azerbijan, where they exclusively occupy whole villages, and have obtained the esteem of the Mohammedans by their industry in agricultural pursuits. Arabians form the bulk of the population in Dushtistan or Gurmsir, where they gain their livelihood as fishermen, seamen, planters of date-trees and merchants.

The wandering tribes of Persia are comprehended under the general term of *Iliyats* or *Ilat*, and are found in every part of Persia; but many of them have become inhabitants of cities and villages. These tribes are accordingly divided into *Shehr-nishin*, or dwellers in cities, and *Sahra-nishin*, or dwellers in the field. A considerable number of them adhere to their original mode of life, and live all the year round in tents, in the winter keeping to the plains, and in summer seeking the pasture of the mountains. The wealth of the Sahra-nishin consists in cattle. They breed camels and horses for sale, and their sheep yield milk, which is made into *raughan* (liquid butter), and sold throughout the country. Their peculiar privileges consist in liberty to range over districts from which no one can exclude them. In the summer they ascend to high mountain-plains and the declivities of the mountain-ranges, where they find abundant pasture, which is called *yaïlâck*, and in the winter they keep to their *kishlâck*, or tracts which enjoy a warmer climate. They pay a tax to government, which is collected by their own chiefs, and are obliged to furnish a certain number of soldiers to serve on foot and on horseback, for which service however the individuals are paid. They are difficult to discipline, owing to their clan-like propensities. They feed principally on the produce of their flocks, and eat sour milk, cheese, dough, or butter-milk, and much raughan. Some of these tribes have the almost exclusive possession of large tracts of country, and consist of a great number of individuals. The most numerous are the Lurs, who inhabit that portion of the mountains of Kurdistan which lies south of 34° N. lat., and comprehends the province of Luristan, together with the mountainous part of Khuzistan. They are subdivided into two great tribes: the *Proper Lurs* occupy the country called Luri Kuchuk, which is situated between the Kerkhah on the west, and the Dezful, a tributary of the Kuran, on the east. They consist of 58,000 families. To the east of the Dezful are the Bakhtiyâris, whose country is called Luri Buzurg, and extends over the mountains of Khuzistan. They consist of 28,000 families. A small number of these tribes are Shehr-nishin, but their country contains towns and villages inhabited by persons who do not belong to these tribes. The language of the Lurs differs slightly from that of the Kurds in the province of Kermanshah, and a person conversant with one dialect can perfectly understand the other. Major Rawlinson is inclined to regard both dialects as derived from the old Farsí, the Farsí Kadím, as it is called. The mountains west of the river Kerkhah are in possession of some Kurdish tribes, among which the Guran, Mikri, and Rewendi are the most numerous: the two last-mentioned tribes contain about 12,000 families each. Many of them, especially the Mikri, have almost entirely abandoned their wandering habits, and cultivate the ground.

The Kurds are also in possession of a large tract of the mountain-region of Khorasan, on the northern border of the table-land of Iran. They do not originally belong to that country, but, according to Morier, were transplanted thither by Shah Ismael, to protect the neighbouring countries against the predatory incursions of the Turkomans, who inhabit the desert plains of Turkistan, and who frequently entered Iran by the large break which occurs in this part of the mountain-range. Only 4000 families were originally settled there, but they have increased to more than 50,000. They effectually protect the frontier, but have themselves become robbers, and frequently lay waste the neighbouring valleys and plains, and raise the standard of rebellion against the sovereign of Persia. They are governed by five chiefs, of whom the khan of Kubushan is the most powerful. He has from 25,000 to 30,000 families under him, of which number two-thirds are Sahrâ-nishín. They have preserved their language, which also resembles the old Farsi, but have adopted the dress of the Persians. To the south-east of these Kurds, between the towns of Mushed and Herat, there is a tribe of Arabs, which was transported to this country from Nejd by Shah Ismael, for the same purpose. They originally consisted of from 2000 to 3000 tents, but have increased to about 6000 tents. They retain their pastoral habits, and are almost all Sahrâ-nishín, or dwellers in the field. They are of the Sunni sect, and partly preserve their language, though they have changed their national costume.

Besides these tribes, which almost exclusively occupy large tracts of country, there are others which are dispersed over other parts, but constitute only a small portion of the population. They are all of Turkish origin, with the exception of the Lak, or Lek, who are considered Persians, and are dispersed throughout the country, but their principal seats are about Cazvin, and in the provinces of Fars and Mazanderan. Their total numbers are reckoned at about 20,000 houses, and they live partly in cities and partly in the plains. Among the Turkish tribes the most remarkable is that of the Kajar, to which the present sovereign family belongs. It came from Turkistan to Persia under Oguz Khan, grandson of Gengis, and settled near Cazvin and Erivan. It is a small tribe, not containing altogether more than 4000 houses. All the members of the tribe are now Shehr-nishin, or dwellers in cities. The Afshars, from which tribe the family of Nadir Shah sprung, number altogether about 20,000 houses, and are dispersed over Irak Ajemi and Khorasan. They principally reside in towns. The most numerous of the Turkish tribes are the Shekagi and the Shah-seven, whose principal seats are in Azerbijan. The first-mentioned tribe consists of about 50,000 houses, and from it the greatest number of the Persian foot-soldiers are drawn. The Shah-seven are calculated at 20,000 families, and make also excellent soldiers. They live mostly in tents, and speak Turkish.

Political Divisions, Provinces, and Towns.—Persia is divided into several governments, whose limits however are frequently changed, and accordingly geographers preserve the antient division into provinces, though in this respect also some changes have been introduced. The provinces are at present twelve in number. Seven lie along the western boundary-line: Azerbijan, Kurdistan, Luristan, and Khuzistan, along the border of the Turkish empire; and Farsistan, Laristan, and Kerman, along the shores of the Persian Gulf. The interior of Persia is occupied by the two large provinces of Irak Ajemi and Khorasan; and along the shores of the Caspian Sea extend the provinces of Ghilan, Mazanderan, and Astrabad.

1. Azerbijan. [AZERBIJAN.]

2. Kurdistan comprehends the mountain region of the Kurdistan range between 36° and 34° N. lat., about the sources of the rivers Sefid-rud, Diyalah, and Kerkhah; it is separated from the Pashalik of Bagdad on the north by the eastern range of the Kurdistan Mountains, called Shahu Mountains, and farther south chiefly by the course of the river Shirwan, a branch of the Diyalah. It is main

separated from Luristan by the river Kerkhah. It is divided into two parts; the north-eastern part, called Ardelan, is subject to a Kurdish chief, and the south-western, called Kermanshah, principally belongs to Persia. The first part, comprehending the country surrounding the upper branches of the Sefid-rud, which is about one-third of the province, consists of a succession of well-wooded mountains and narrow valleys, and has excellent pasture-grounds. It contains Sehnah, the residence of the Kurdish chief, who lives in a sumptuous palace, built on a small hill in the middle of the town. It contains, according to Rich, between 4000 and 5000 families, among which 200 are Jews, and 50 Chaldæan Christians of the Catholic communion. Kermanshah also is principally mountainous, but there are fine wide open valleys along the rivers Shirwan and Kerkhah, and pretty extensive plains near the outer edges of the mountain region: both the valleys and plains are generally well cultivated. Kermanshah, the capital, a flourishing town, is situated in the southern extremity of a fine plain, through the centre of which runs the Karasu, an affluent of the Kerkhah. It contains about 12,000 houses, and has many public buildings. It carries on a considerable commerce, being on the great caravan road which passes across the mountains between Bagdad and Hamadan, Ispahan, and Teheran. This road seems always to have been a great thoroughfare, and ruins of great antiquity occur along it. About six miles from Kermanshah, on the face of the mountains which enclose the plain on the north, are excavations and sculptures of great extent, called Takt-i-Bostan. Where this range of mountains terminates on the east, on the banks of the river Kerkhah, are the sculptures of Besittoon. [Besittoon.] About 30 miles farther east, also near the road, there are extensive ruins, among which those of a temple of Artemis are the best preserved. They occur near a village called Kengawar, which is about 30 miles west-south-west of Hamadan. [Ecbatana.]

3. Luristan, which lies between the Kerkhah and the Dizful, an affluent of the Kuran, is entirely occupied by mountains and narrow valleys, except some plains of moderate extent near the outer ridges of the mountain region. These plains alone are under cultivation, the remainder serving only as pasture-ground to the different tribes of Lurs who inhabit it. In the centre of the mountains is an extensive tract, 70 or 80 miles in length, in which no human dwelling is met with, and which is traversed in its length by the road leading from Dizful in the province of Khuzistan to Khorrám-abad. There is no town in this province, except Khorrám-abad, which stands in a fertile and tolerably extensive plain at the northern extremity of the mountain desert. The town contains about 1000 houses, and is built on the south-western face of a steep rock, on which a strong fortress and palace are erected.

4. Khuzistan comprehends the southern part of the mountains of Kurdistan and that part of the plain of the Tigris which belongs to Persia. It is therefore naturally divided into two portions. The plain, which is in possession of some Arab tribes, contains good pasturage in the northern and western districts, and here the wandering Beduins pitch their tents. But the southern and eastern portion of it is a sandy desert, occasionally intersected by extensive morasses, and only cultivated in some places on the banks of the rivers, where rice and some wheat and barley are raised. There are also a few plantations of date-trees. In this part of the plain is the town of Dorak, or more properly Felahi, on the banks of two of the branches of the river Jerabi: it is a large place, the walls of which are two miles in circumference; but notwithstanding this, the houses are few, as the majority of the people live in the suburbs under the shade of the date-trees. This town is celebrated for its manufacture of Arabian cloaks, which are exported to all parts of Persia and Arabia. Endian, which is situated near the most southern extremity of the province, on both banks of the Tab, has some trade with Básra, or Bassora, and from 4000 to 5000 inhabitants.

The mountainous part of the country contains several plains and valleys of great extent, which are fertile, but only partially cultivated, among which the valley of Ram Hormuz, which is 40 miles long and from six to eight miles wide, is distinguished by its soil and picturesque beauty. Between the higher ranges of the mountains and the level plain runs a hilly tract several miles wide, which contains a large portion of cultivable land, though at present only the borders of the rivers are under cultivation. It is however the most fertile portion of the province. The high mountain-ranges in the eastern districts of the province are in possession of Lurish tribes, which have almost entirely settled in villages, and cultivate the ground. Tobacco is extensively grown and exported. The present capital of the province is Dizful, on the river of the same name, a considerable place, with 20,000 inhabitants, and a fine bridge over the river. About 10 miles south-west of this town are immense heaps of ruins, on both sides of the river Kerkhah, which mark the site of Susa. [Susa.]

The second town of the province, and formerly the capital, is Shuster, which stands not far from the high mountain-ranges on the river Kuran. The houses are good, being principally built of stone, but the streets are narrow and dirty. There is a considerable manufacture of woollen stuffs, which are exported to Bassora in return for the Indian commodities brought from thence. It has lately suffered much from the plague; but the population still amounts to 15,000. The town is supplied with water by extensive hydraulic works. The mountains east of Shuster are traversed by roads leading to Irak Ajemi and Farsistan; and though they are now little frequented, the extensive ruins which exist in the valleys and plains along these lines of road show that large towns were once situated on them. They have not however been visited by Europeans, being situated in a country which offers few attractions, and is in possession of tribes which pay little obedience to the king of Persia. According to the information which Major Rawlinson has collected from the natives, there are extensive ruins in the plain of Mal Amir and others near Gilgird. He thinks that those in the plain are the ruins of the town of Eidij, and that the others belong to the Susan of the Scriptures. There are also sculptures near Gilgird, which are like those of Besittoon. These ruins are the most northern of the numerous remains of antient magnificent buildings which are dispersed over the mountain region of Farsistan as far as the town of Darabgherd on the borders of the province of Kerman, and which evidently show that this part of Persia was once the seat of a rich and powerful monarchy.

5. Farsistan, or Fars, the antient Persis, comprehends nearly one-half of the Dushtistan, a low, hot, sandy strip which extends along the shores of the Persian Gulf, the northern portion of the mountain-region of Farsistan and Kerman, and the hilly plain which extends north-eastward to the lake of Bakhtegan and the Great Desert. The mountain-ranges, which in this part separate the table-land of Iran from the Persian Gulf, are hardly more than 30 or 40 miles wide, but exceedingly steep towards the sea. They consist of three or four rocky ridges, which can only be crossed by narrow roads over rugged mountain-passes. The most frequented road leads from the harbour of Bushire to the towns of Kazerun and Shiras. It passes to Kazerun over four ridges through the kotuls (mountain-passes), Mulloo, Khescuht, Komaredge, and Tag-i-Turkan. Between Kazerun and Shiras the kotuls Dókhter and Pirazun are to be traversed; for though Kazerun is situated on the table-land, there are several ridges on it which rise to a considerable elevation, especially in the northern districts. The less mountainous portion of the table-land, which lies farther south, contains several salt lakes. Though there are many well-cultivated districts in this province, a great portion of it is nearly desert, especially towards the north. The southern part of the coast, east of Ras (Cape) Berdistan, is occupied by Arabs, who acknowledge the authority of the iman of Muscat; and in the northern districts there are some tribes of Kurds. In that part of the coast which is subject to the iman are the town and harbour of Congoon, near Cape Berdistan. The town is stated to have 6000 inhabitants, and some trade is carried on with Bassora, Muscat, and the different towns on the Persian and Arabian coasts. Near it is an excellent roadstead, where a frigate may lie at anchor in safety. The principal commercial place is Bushire, or Aboushehr. [Aboushehr.] The principal towns in the interior, from west to east, are Behaban, Kazerun, Shiras, Firoze-abad, and Darabgherd. Behaban, near the boundary-line of Khuzistan, is situated on a very mountainous tract, but in an extensive and highly-cultivated plain: it is about three miles in circumference, and contains nearly 10,000 inhabitants. The mountains between this place and Shiras are nearly uninhabited. Kazerun, in a valley 30 miles long and seven or eight wide, was once a considerable place, but has been depopulated by civil wars. In 1809 it contained 3000 or 4000 inhabitants. Shiras,

the capital of the province, and for some time the residence of the kings of Persia, stands in a fertile plain, surrounded by extensive gardens. It is six miles in circumference, but a great part of the area is covered with ruins. The houses are generally small, and the streets narrow and filthy. None of the edifices are remarkable for antiquity or beauty, except the great Bazar, or Bazar-i-Wukell, which is a magnificent arcade nearly half a mile long and perhaps forty feet wide. It is constructed of yellow burnt brick and arched at the top, with numerous skylights, which, with the doors and windows, always admit sufficient light and air, whilst the sun and rain are completely excluded. It affords accommodation to several hundred shopkeepers. This town carries on a considerable trade with Yezd, Ispahan, and Bushire. Through Bushire it receives goods brought from India and Europe, which it exports to Yezd and Ispahan, receiving in return the manufactures of those two cities. The population is variously stated at 40,000 and 60,000. This place contains several manufactures of cotton, glass, iron, and gunpowder. The swords are made of steel brought from India, from the town of Lahore, and much prized, though less so than those of Khorasan and Kerman. The glass-houses are very extensive, and the manufactures are exported to all parts of Persia. The wine, made by the Armenians who are settled in this town, is thought to be equal to any in Asia. Shiras is also famous for its roses and the rose-oil which is obtained from them. Near the city are the tombs of the Persian poets Sadi and Hafiz. Firoze-abad, a town situated in a fertile plain, contains about 4000 or 5000 inhabitants. Darabgherd, a town containing from 15,000 to 20,000 inhabitants, is surrounded with groves of orange and lemon trees, and the juice of their fruit constitutes a considerable article of export to other parts of Persia. The tobacco cultivated here and at several other places in the neighbourhood is the best in Persia, and perhaps in the world. It is sent to distant places. North of this place is the pass of Ursinjan, which leads to Robat in Kerman, and runs for two miles between perpendicular mountains.

In no part of Persia is the number of ruins so great as in Farsistan. The most remarkable are those of Persepolis [PERSEPOLIS], which are situated north-east of Shiras, at a small place called Istekhar or Istakhr. The ruins of the antient town of Shapur are situated north-west of Kazerun, where they cover an area six miles in circumference, amidst rocks and precipices, many of which are decorated with sculptures similar to those near Persepolis. A statue from 15 to 20 feet high, now mutilated, is found in an immense cavern at Shapur. At Mourghab, 49 miles north-north-east of Istakhr, are other extensive ruins, resembling those of Persepolis, among which a building, called by the natives Musjed-i-Madre Solyman, is remarkable. It is considered by some persons to be the tomb of Cyrus the Great. [PASARGADÆ.] Near the great ruins of Persepolis are the Naksh-i-Roostan and the Naksh-i-Rejib, both of which are considered to be the tombs of kings of the Sassanian dynasty. Very extensive ruins occur in the neighbourhood of Firoze-abad. They occupy a large space in the plain, about 17 miles in length and half that distance in width, but have not been examined by European travellers. Other ruins of some extent occur in the neighbourhood of Darabgherd, and in several other places.

6. Laristan occupies the country between Cape Berdistan and the island of Kishm, and consists of the Dushtistan, or the low tract along the sea, and a hilly country. The low coast is in possession of the Arabs, who are subject to the iman of Muscat. The hilly country, which is about 100 miles in width, is sterile along the low plain, but seems to contain a great number of fine valleys, which produce dates and other fruits, and also grain. But as this country has seldom been visited by European travellers, we are very imperfectly acquainted with its capabilities. There are several small harbours on the Persian Gulf. The capital, Lar, is at the foot of a range of hills, in an extensive plain, which is covered with palm-trees. It contains about 12,000 inhabitants, and is celebrated for the manufacture of swords, muskets, and cotton cloth. The bazar is the noblest structure of that kind in Persia. It is built in the same manner as that of Shiras, but on a much grander scale, the arches being more lofty, the breadth and length greater, and the work in every way superior. The houses are commodious. The only water used is from large cisterns, in which it is collected during the wet season. Tarun, east-north-east of Lar, is as large and populous as Lar, but meanly built: it carries on a considerable commerce with Muscat, Gombroon, and Shiras.

7. Kerman occupies the south-eastern part of Persia, extending along the Persian Gulf from Cape Jask to a place opposite the island of Kishm, and thence northward to the borders of the desert, of which the adjacent southern part is considered as included in this province, and called the desert of Kerman. The desert is sandy and impregnated with salt, and here and there intersected by short rocky ridges. The remainder of the province, which extends more than 200 miles from south to north, but less from west to east, is nearly unknown, except the tract along the shores of the gulf, and another tract in the interior, between [illegible] and 30° N. lat. That part of the coast east of 57° E. long., which lies along the narrow entrance of the gulf, is extremely mountainous, and the rocks come close up to the sea, where they form a lofty coast. The short valleys in these mountains are well watered, afford pasturage all the year round, and contain fine plantations of date and other fruit trees. This is particularly the case where the coast runs south and north between the small town of Sereea and the large town of Mináb or Mináw. Between these two places the mountains retire from the shores, and thus a plain is formed which is very fertile; it is termed by the natives the Paradise of Persia. It abounds in every kind of fruit. The mountains then run northward, and form as it were a large gulf, retiring more than 50 miles from the sea, and then returning to it to the north of Bunder Abassi, or Gombroon. The plain thus formed rather resembles the sandy tract called Gurmsir than the country surrounding Minab, being sterile and producing nothing except dates. That portion of the Gurmsir which is within Kerman is subject to the iman of Muscat, who however pays a certain annual sum to the king of Persia. That portion of the interior of Kerman which has been visited by European travellers comprehends the Nurmanshir, a district about [illegible] miles in length, and from 20 to 30 miles wide, in which are several small towns, surrounded by large orchards and extensive cultivated grounds, and comparatively small sterile tracts. Two mountain-ranges enclose this district on the south and north. The southern range is of considerable elevation, and covered with snow during the greater part of the year. Between the Nurmanshir and the town of Kerman is a desert, with a few oases of moderate extent, and about the town itself there is a large tract of very fertile country. West of the town, to the very boundary of Farsistan, there are numerous rocky ridges, with difficult passes, and several large villages, with a good deal of cultivation round them. The town of Kerman, which was destroyed in the civil wars of Persia in 1794, still contains a population of 20,000 souls, of whom a small portion are Guebres: there are also Armenians, Jews, and Hindus. The trade is still considerable, and it is celebrated for its manufactures of shawls, matchlocks, and carpets, which are chiefly exported to Khorasan and the northern provinces, and in return for which are received drugs, skins (from Bokhara), furs, silk, steel, and copper. These articles, as well as pistachio-nuts, carpets, rose-buds, and bullion, are sent to India, from whence spices, cotton manufactures, broadcloth, china and glass wares, hardware, indigo, tin, lead, and iron are received. The bazar, which is extensive and well built, is abundantly supplied with articles of every description; and there are nine large caravanserais within the walls, and a number of inferior ones both within and without. In the unknown country between Kerman and the harbour of Gombroon, and on the road connecting these two towns, there is said to be a large place called Sultanabad. [GOMBROON.] Of Minab nothing is stated but that it is a large place with very commodious houses.

Opposite the town of Gombroon, and about 9 miles from it, is the island of Kishm, the largest in the Persian Gulf. It is 60 miles long, but the widest part does not exceed 12 miles. It is separated from the mainland by a narrow channel, which is very intricate, but navigable for the largest ships. It is stated that Kishm once contained upwards of 200 villages and towns, but they have been reduced to [illegible] that number. The inhabitants live by fishing and agriculture; and the island produces dates, wheat, and vegetables, with a few grapes, mangoes, and water-melons. There are two towns; Kishm, at the southern extremity, with [illegible] inhabitants, and Laft, on the northern side. At Bassadore, at the western extremity of the island, the East India Company had an establishment some years ago. Not far from Kishm is Hormuz. [Ormuz.]

8. Khorasan, or Khorassan, extends over a large part of the Great Desert, and over nearly the whole of the mountainous region which lies north of it. According to the Persian geographers, it once comprehended the whole of northern Persia as far as the neighbourhood of the Indus, and consequently nearly the whole of the country now subject to the king of Afghanistan. At present however its eastern boundary lies near 62° E. long., and even the town of Herat is subject to the Afghans, who however acknowledge that it belongs to Persia, and annually send a present to Teheran, as a sign of this acknowledgment. In that portion of the desert which lies between Herat and Yezd, numerous oases occur; most of them are small, but some are of considerable extent, and contain large towns. Among these towns are Gunabad with 30,000 inhabitants, Boshrewyah with 20,000 inhabitants, and Tubbus with a still larger population. Our information respecting these places has indeed only been obtained from natives, whose statements have usually been found to be very incorrect and exaggerated. But the wide valleys which lie between the desert and the declivities that form the descent from the table-land of Iran to the low sandy plains of Turan, must possess a considerable degree of fertility, as there are several large towns here, and the villages are numerous and populous, in spite of the frequent incursions of the Turkomans and Kurds. The latter were settled in a wide and very fertile valley which extends from the town of Mushed in a north-western direction for more than 100 miles, for the purpose of protecting the country against the invasion of the Turkomans; but they frequently themselves lay waste the most fertile portion of Khorasan. The most important town is Herat, the population of which is estimated at 45,000 by Conolly; it had been formerly stated at 100,000. It is built in a plain, which is 15 miles wide, 30 miles long, well watered, and covered with orchards, vineyards, fields, and villages. The city occupies an area of four square miles, and is encircled with a lofty wall and wet ditch. It forms a square, and has a gate in each side, and two in that which fronts the north. From each of the four principal gates a spacious bazar leads towards the centre of the town, where they terminate in a small square, which, like the bazars, is arched at the top. The town contains 1200 shops, 17 caravanserais, 20 public baths, many public reservoirs for water, and a great number of mosques. The manufactures are numerous, and supply carpets of wool and silk, and sword-blades, both which articles are used all over Persia. The commerce is very considerable, as the place is situated on the only great thoroughfare which leads from India to the western countries of Asia. The vicinity supplies some articles of commerce. Dry fruits and horses are sent to India, and to the western countries assafoetida, saffron, pistachio-nuts, mastic, manna, a gum called *birzund*, a yellow dye called *zyrsuch*, and carroway seeds. From India, Cashmere, Cabul, and Bokhara, shawls, indigo, sugar, chintz, muslin, leather, and skins are imported, most of which are re-exported to Mushed, Yezd, Kerman, and Ispahan; and from these latter places there are received in return, dollars, tea, china-ware, broadcloth, copper, pepper, and sugar-candy; dates and shawls are imported from Kerman. The shortest road from Herat to Teheran runs along the northern border of the Great Desert, and on it there are two places of importance, Toorbut (20,000 inhabitants) and Toorshish, but this road is not much used. The most frequented road runs from Herat in a north-west direction to Mushed, and thence westward through Nishapoor and Subzewar to Shahrood and Bostam. Mushed or Meshed occupies a larger space than Herat, but many of the houses are uninhabited and in ruins. The population amounts to 45,000, which however is often doubled by the number of pilgrims who visit the shrine of Imam Reza. A very wide avenue leads from the eastern to the western walls of the town, and is only interrupted by the tomb or shrine of Imam Reza. In the middle of it is a canal, and on both sides well furnished shops. The mausoleum is a magnificent building of great extent, and kept in good condition. A silver gate, the gift of Shah Nadir, opens into the chief apartment, which rises into a noble dome and branches out into the form of a cross. Neither Jew nor Christian is permitted to enter this building. The city has many mosques and sixteen medresses or colleges. There are also some manufactures; the most famous are those of steel, especially sword-blades. The silk manufactures also are of some importance; good velvet and some simple stuffs are made. A great number of persons are occupied with making jewellery, especially polishing and setting of turquoises for the pilgrims, who buy an immense number of them. Several utensils, as cups, plates, dishes, &c., are made from talc and exported. Mushed carries on a considerable trade with Bokhara, Balkh, Candahar, Yezd, Shiraz, Ispahan, and Herat. The town of Nishapoor, which was once a very large place, now contains only 8000 souls. In its neighbourhood are the famous turquoise mines, which are about 40 miles from the town towards the north-west. Subzewar contains about 1000, Shahrood 3000, and Bostam 4000 inhabitants. In the neighbourhood of these towns cotton is grown to a great amount.

The wide and fertile valley which runs from Mushed north-west, and is in the possession of the Kurds, contains some places of note. The largest is the town of Kabooshan, which contains from 15,000 to 20,000 inhabitants, and is the seat of the most powerful of the five chiefs of the Kurds. It has some commerce in wool, woollen stuffs, tallow, butter, and sheep-skins. Some distance east of the town is the celebrated fortress of Kelat Nadiree (the fortress of Nadir), which, according to the information obtained by Fraser from the natives, is in a valley from 50 to 60 miles long by 12 or 15 in breadth, surrounded by mountains so steep that a little assistance from art has rendered them quite impassable, the rocks being scarped into the form of a gigantic wall. A small river runs through this valley, and the only points of access occur where the stream leaves it; and even these are fortified by towers and walls, which are considered impregnable. The valley is well cultivated, and contains 2000 families in twenty or thirty villages.

9. Irak Ajemi, the largest of the provinces of Persia, comprehends a considerable portion of the Great Desert and the countries which enclose its north-western extremity on the west and north, and which in their different parts display a great variety of natural features. South of Ispahan (32° 30′ N. lat.), the mountains of Kurdistan terminate abruptly towards the table-land of Iran, and the country which lies between them and the desert, a space of more than 100 miles, consists of long and wide valleys running west and east and terminating in the desert. Little water is found in them, except after the melting of the snow, and only a small part of them is cultivated, though the soil seems rather fertile. North of Ispahan, as far as 30° N. lat., the Kurdistan mountains do not terminate abruptly, but between them and the plain there is a mountainous district, containing wide, fertile, and well watered valleys. East of this district extends a plain, about 40 or 50 miles wide, traversed by several broad and low ridges, and terminating on the border of the desert. It contains only a few cultivated tracts. That portion of Irak Ajemi which lies north of 35° N. lat. belongs to the table-land of Azerbijan: its surface stretches out in a plain consisting of gradual ascents and descents, and furrowed by deep valleys in which the rivers flow. Though nearly the whole of this province is destitute of trees, it has excellent pasturage and many well cultivated tracts. The surface is considerably higher than the plain farther east, and therefore the climate is not so hot in summer. The range of the Elburz mountains, with its well watered and fertile valleys, and its high summits, is included in Irak Ajemi, as well as the hilly country which skirts its southern base, and which is generally well cultivated, being irrigated by the rivers that descend from the southern declivity of the Elburz mountains.

That part of the desert which is included in Irak Ajemi contains an oasis of considerable extent, in which the town of Yezd is situated. The oasis has a sandy soil, and is mostly enclosed by mountains. But though it is sparingly watered, it produces much silk and fruit: the wheat that is raised is only sufficient for forty days' consumption, and large quantities of grain are imported from Ispahan. On the north, east, and south, the Great Desert spreads out to a great extent; but on the west, a series of small oases connect that of Yezd with the more fertile districts east of Ispahan. The town of Yezd is very large, containing about 8000 houses and 50,000 inhabitants, among which 3000 or 4000 families are Guebres, or fire-worshippers. These industrious people likewise constitute a great part of the population of the villages of the oasis. Yezd is remarkable as a commercial and manufacturing town. Its commercial importance arises from the caravan routes, which here cross one another. Two of these routes come from Herat and Mushed; two from the west, from Ispahan and Shiras; and one from the south, from Kerman. Thus this town is the entrepôt of the commerce between India, Turkistan, and the western countries of Asia. Its silk manufactures are more extensive than those of other towns, and a great variety of silk stuffs are manufactured. Though a considerable quantity of silk is grown in the oasis, still much is imported from Ghilan. Cotton is also manufactured to some extent, as well as carpets and felts; and much sugar-candy is made and exported. The summers are very hot, but the winters are cold. A good deal of snow falls, but it does not lie long on the ground.

Ispahan, or, more correctly, Isfahan, is still perhaps the most populous town in Persia, though much less so than it was in the time of Chardin, when it was the residence of Shah Abbas the Great, and was stated to contain between 600,000 and 1,000,000 inhabitants. At present the population is said to amount to between 100,000 and 200,000. It stands on the banks of the river Zeinderud, which during the heats of summer has little water, but in the spring months is equal to the Seine at Paris in winter. The mud walls are 24 miles in circuit. The streets are crooked, narrow and dirty, and unpaved, like those of most Persian towns. Ispahan contains a great number of magnificent palaces, large private buildings, spacious caravanserais, and handsome bazars, most of which however are now in a state of decay. On the southern side three nobly-constructed bridges cross the river; and near them, within the town, is a number of shady avenues of trees, which render that part of the city a very paradise, and lead to the great bazar of Shah Abbas. This extensive building is vaulted above to exclude the heat, but it admits air and light: it is now nearly abandoned. In a still worse condition is the Maidan Shah, or Great Square, which is 700 yards long and 200 wide, and enclosed by a double range of arched recesses. The houses in its vicinity are no longer inhabited, the very doors are built up, and a blank row of archways occupies the place where the most brilliant shops formerly displayed their wares. The other bazars are still partly crowded, but most of the numerous caravanserais have been converted to other and meaner purposes. The most sumptuous of the palaces is the Chehel Sittoon, with its hall of columns inlaid with mirrors so as to resemble pillars of glass. This building is situated in the centre of a garden, divided, according to the Persian fashion, into compartments by walks and canals bordered with poplars and stately chinars. There are also many other palaces, each with its own garden. Many of the mosques and medresses are in ruins; but a few of them are still in good preservation, especially the medress built by the mother of Shah Abbas, the gates of which are covered with wrought silver. Near the town is the suburb of Julfa, which is inhabited by Armenians, and contains a population of 12,500. The commerce of Ispahan with India, Bokhara, Shiras, Kerman, Bagdad, and Teheran is very great. The manufactures are various and numerous: in that of gold brocade it has attained unrivalled excellence.

The plain which extends from Ispahan to Teheran contains the towns of Kashan and Koom. Kashan is one of the most flourishing towns in Persia: it owes its prosperity to its manufactures of silk and cotton stuffs, brocades, carpets, and especially copper wares. It is as large as Shiras, but better peopled. Koom, which lies farther north, a large place, but almost entirely in ruins, was formerly celebrated for its manufactures of silk: at present it is only noted as a place of pilgrimage. Among the shrines of this sacred place, that of Fatima, the sister of Ali Reza, the eighth iman, is the most celebrated. Her tomb is in the centre of a lofty mosque, adorned with mosaic work in coloured tiles, and fitted up with rich carpets. The dome is covered with gilt tiles. There are some medresses, or colleges. In the mountainous country west of these towns are Khonsar and Hamadan. Khonsar is built in a long narrow valley, between steep and barren mountains, and is six miles in length, though not more than a quarter of a mile in width. It consists of isolated houses, surrounded by extensive orchards, and contains 2500 families. Hamadan is on or near the site of the antient town of Ecbatana. [ECBATANA.] North of Hamadan, on the table-land of Azerbijan, lies the town of Zenjan, a populous and thriving place, which derives its importance from being situated where the roads from Hamadan and Teheran to Tabriz meet. West of this town, near the boundary-line of the province of Azerbijan, or rather within the last-mentioned country, are extensive ruins, called Takht-i-Soleiman, which Major Rawlinson supposes to be those of the antient town of Ecbatana of Atropatene, or the Ecbatana of Dejoces. South-east of Zenjan, and at no great distance from it, is Sultaniyah, a town quite in ruins, in which the reigning royal family has built a palace, to which they retire when the heat in Teheran becomes oppressive. East of Zenjan is the famous pass of Rudbar, where the river Sefid-rud forces its way between the mountains of the Elburz and Massula ranges to the plain of Ghilan. It is more than 30 miles long, and the river dashes down between the rocks with incredible velocity. On the road from Zenjan to Teheran is Kazvin, or Casbin, one of the largest and most commercial towns of Persia, the population of which is differently stated at 20,000 and 60,000. It carries on a considerable commerce with Tabriz and Resht in Ghilan, and has manufactures of silk, carpets, and sword-blades.

Teheran, or Tehran, the present capital of Persia and seat of government, is situated on a plain about eight miles from the base of the Elburz range, in a country without trees, and only covered with verdure during the spring. The town is about four miles in circumference, surrounded by a strong and high mud wall flanked by numerous towers and a dry ditch. The streets are narrow and crooked; the houses are built of sun-dried bricks, and are mean, with the exception of a few palaces. The only building of consequence is the citadel, which contains the palace of the sovereign and his officers; but these buildings are much inferior in magnificence and beauty to the palaces of Ispahan. The population, which is rapidly increasing, varies according to the seasons. In winter and spring it may amount to 100,000, but when the king goes to Sultaniyah, it is diminished by one-third of that number. In the neighbourhood are the royal country-houses called Takht-i-Kujeriah and Nigaristan, and the ruins of Rai, the Rhagæ of the antients, and once the capital of the Parthian empire. The ruins consist of heaps of earth and rubbish, strewed with broken bricks and crockery. On these ruins is built the village of Shah Abdul Aazeem, which contains about 500 mud huts. About 70 miles east of Teheran, on one of the mountains of the Elburz range, is the fortress of Firuz-kuh, which is thought impregnable and of great importance, as it commands the principal and most accessible of the mountain-passes which lead over the range to the plain of Mazanderan. On the caravan route which leads from Teheran to Mushed are the towns of Semnoon, with from 4000 to 5000 inhabitants, and Damghan, with 2000 inhabitants.

10. Ghilan comprehends the western portion of the low plain which surrounds the southern shores of the Caspian Sea. It is the lowest part of the plain, and more subject to inundations and continual rains than Mazanderan, which lies farther east. During the greater part of the year it is properly a swamp, covered partly with forest-trees and partly with plantations of mulberries and rice-fields. There are no villages in this country, the peasants residing either in single dwellings or in small communities seldom exceeding eight houses. In some places there are bazars, which, as well as the small clusters of huts, are situated in the midst of the forests or plantations of mulberry-trees. Resht, the capital of Ghilan, one of the most commercial places in Persia, is situated in the midst of a forest at some distance west of the mouth of the Sefid-rud. The population is variously stated between 50,000 and 80,000. The houses are of a superior construction, and the streets generally well paved. Its commercial connections extend to Mushed and Herat, Teheran and Ispahan, and also to Badku and Astrakhan. There are several extensive manufactures of silk stuffs. The commerce with Astrakhan is carried on by means of the port of Enzillee, which is about [illegible] miles from Resht, and separated from it by a lagoon. The lagoon is from 30 to 40 miles long, from 12 to 15 wide, and from 8 to 10 feet deep, but shallower near the banks. It is separated from the Caspian Sea by a narrow and low sandy tract, which has a cut near the middle that serves as the entrance to the harbour of Enzillee. It is about half a mile long, about 500 yards wide, and 8 feet deep; but the bar which lies before it has seldom, except after north-east winds, more than 4 feet of water; and accordingly only small vessels, from 50 to 70 tons burden, can enter the harbour of Enzillee. This harbour lies on the west of the entrance, and is safe, being protected on the north by the narrow strip of land from the surf of the Caspian Sea, and on the south by an island. The town of Enzillee is a collection of

miserable huts, built on the south side of the narrow strip of land opposite the harbour. The population amounts to 2500. The goods to be shipped in this harbour are conveyed from Resht on horses to Peeri bazar, which lies on the banks of a small river, one of the feeders of the lagoon, and at that place they are embarked for Enzillee in boats. Lahijan is a neat well-built town, on an island formed by the bifurcation of the river Sefid-rud. It has a considerable commerce in silk with Resht and Ispahan. The population, according to Fraser, amounts to 15,000, but Monteith reduces it to 7000. The most northern portion of Ghilan is called Talish; the mountains which divide it from the table-land of Azerbijan are in possession of a tribe of mountaineers, who resemble in character and manners the Lesghis of Mount Caucasus, and are only nominally subject to the king of Persia.

11. Mazanderan comprehends the largest and widest portion of the low plain along the shores of the Caspian Sea. Though the country along the sea is very low and marshy, it rises somewhat at a short distance from the shore, owing to which circumstance the inundations produced by the heavy rains are less extensive and of much shorter duration, especially as the rains themselves are less frequent and less heavy, than in Ghilan. The climate is accordingly much more healthy, and several plants are extensively raised which do not succeed in Ghilan, especially the sugar-cane and cotton; but it does not produce so much silk as that province. It is however very well cultivated, and populous. Fraser compares the district between Balfrush and Amol with Bengal. The most western town in Mazanderan is Amol, mainly built on the western banks of a small river, the Herhaz, in a very irregular way, the houses being dispersed, and enclosed by orchards and groves. It contains from 35,000 to 40,000 inhabitants, and has some commerce in silk, the greatest quantity of silk collected in Mazanderan being grown in its neighbourhood. The river is navigable, at least during the greater part of the year, as far as the town for boats; the mouth does not form a harbour, but only some shallow lagoons. [AMOL.] Farther east is Balfrush, the most populous and commercial town in Persia, with 36,000 houses, according to Fraser. [BALFRUSH.] It carries on a very extensive commerce with Astrakhan and Badku, chiefly importing naphtha, which is used as lamp-oil all over Persia: also cloth, paper, hardware, gunpowder, leather, and iron: it gives in return the produce of the country, especially silk and sugar, with smaller quantities of rice, cotton, and timber; and also some articles obtained from the other provinces of Persia and from India. The river Bawul, on which it is built, is navigable for boats from the town to the mouth, where it forms a harbour for small vessels, and where there is a town of moderate extent. This town, called Mushed-i-Sir, is very thriving: it also contains the shrine of a saint. The river near its mouth is 60 yards wide, and from 12 to 15 feet deep, but a bar at the mouth prevents vessels from entering it. Russian vessels which visit the place are accordingly obliged to remain in the roadstead, the larger vessels at a distance of about one mile and a half, and the smaller of about a quarter of a mile. Saree is considered the capital of the province, being a very antient town and the seat of the governor. The walls, which are of mud, with square brick towers, are about two miles in circuit. The streets are unpaved, and often impassable in bad weather. The town contains a population of 30,000 or 40,000, and has some commerce with Astrakhan by means of its harbour Farah-abad, situated at the mouth of the river Tejen, which runs east of the town. At Farah-abad some Russians have established a very extensive fishery, as great numbers of sturgeons enter the river: they send caviar and isinglass to Astrakhan. At this place are the ruins of a large palace built by Shah Abbas the Great.

A great artificial road called *keyabun* was constructed by Shah Abbas the Great, through the provinces of Ghilan and Mazanderan. It begins at Kiskar, the western extremity of Ghilan, traverses the low plains of the provinces of Ghilan, Mazanderan, and Astrabad in their length, and ascends the declivity of the table-land of Iran by the pass which leads to Bostan in Khorasan, whence it is carried within a short distance of Mushed. In most parts it is still used, though it has been damaged in some places by torrents and inundations. It appears to have been 15 or 16 feet wide, and to have been constructed by filling a deep trench with gravel and stones, over which a regular causeway was very firmly built.

12. Astrabad comprehends the eastern portion of the low plain extending along the banks of the Caspian Sea, and the hilly country contiguous to it on the south. It is considered to extend to the banks of the river Attreck, but the country between that river and the Gourgan river, though of great fertility, is uncultivated and uninhabited, on account of the predatory incursions of the Turkomans, who wander about in the desert north of the river Attreck. In certain seasons of the year the Turkomans pasture their herds between the two rivers. The portion of the plain included in this province is in general higher above the level of the Caspian Sea than Mazanderan and Ghilan, and much less wooded. The fruit-trees succeed better, but the quantity of silk which is collected is not great. The climate, like that of Mazanderan, is unhealthy, though less so than that of Ghilan. For a description of its capital Astrabad see ASTRABAD. The commerce is not important. Every year one or two caravans, consisting of from 80 to 100 camels, go to Khiva and Urgendsh, but they are exposed to the attacks of the Turkomans, whose country they must traverse.

Manufactures.—The manufactures of Persia are numerous and of various kinds. All the towns, which once possessed a great population, and have not entirely fallen into decay, have preserved some branch of their numerous manufactures. But they have been much reduced, owing to the constant internal wars which laid waste the country for more than a century, and greatly diminished the population and wealth, and consequently both the power of producing and the means of purchasers. In the manufacture of some articles the Persians are still distinguished, as in several kinds of silk stuffs, especially brocades, and sword-blades, leather, carpets, felt of camel-hair, and jewellery. No machinery being used in the Persian manufactures, the cotton and silk goods lately introduced by the British have obtained a ready sale owing to their cheapness. The greatest number of manufactures are in the towns of Ispahan, Yezd, Herat, Tabreez, Kerman, Kashan, and Mushed. Those of the other towns are generally on a small scale.

Commerce.—The internal commerce of Persia is very considerable. The different regions which compose this extensive empire differ considerably in their natural productions, and the transport alone of commodities gives occupation to a great number of merchants and other people. To this must be added the produce of the manufactures, and the numerous articles which are brought into Persia from the neighbouring countries, especially from India, and are distributed all over the country. This commerce is entirely carried on by caravans. Though this mode of transporting merchandise is much more expensive than that in our country, it is the only mode which can be adopted in Persia, not so much owing to the want of roads, in which however the country is almost entirely deficient, as the impossibility of making them safe against robbers, and more particularly the predatory attacks of the wandering tribes. As the great thoroughfares generally pass within 20 or 30 miles of, and frequently on, the very border of the deserts, which are haunted by those tribes, single travellers would be subject to continual attacks from them, and thus all are obliged to unite in a caravan to secure their safety.

The most frequented caravan route runs on the northern side of the desert. By this road a great quantity of goods is brought from India and distributed over the northern parts of the country. It begins on the Indus at Attock, and runs up the Cabul river to Jillahabad, which is the starting-point of the caravans. Hence they pass to Cabul, and from Cabul in a south-western direction to Candahar, which direction they take to avoid the mountain region on the north, which is inhabited by the tribes of the Eimach and Hazarch. From Candahar they proceed chiefly along the base of that mountain region to Herat. At Herat the road divides. One branch runs west-south-west through several oases of the desert to Tubbus, and thence to Yezd. From the last-mentioned place it reaches Ispahan and Shiras. The other branch runs north-west to Mushed, and thence through Nishapoor to Shahrood and Teheran. Conolly gives us an idea of the extent of trade carried on by this road when he says, that the duties levied on the merchandise sold at Mushed amount to 15,000 tomans, or nearly 10,000*l.*, and according to this estimate, the whole amount of their value can hardly be less than half a million of English money. He enumerates also the articles, and indicates the countries from which they are brought, as from Ispahan and Yezd, fine velvet, silks, cotton-stuffs, felt, shoes, sugar, and candy-sugar; from Cashan, gold and silver, kimcob, cotton-socks, ink-stands, lamps of bronze, pots, and other utensils of copper; from Shiras, dates, tobacco, lemons, laquered-ware, ornaments made of ivory, and mats; from Kerman, shawls, candy-sugar, opium, henna, and indigo; from Sind and Hind, sugar, candy-sugar, spices, musk, amber, corals, precious stones, leather, kimcob, Indian and British muslins, and indigo; from Cashmire and Bokhara, shawls, saffron, paper; from China and Russia, by the way of Bokhara, lamb-skins (more than 120,000), stuffs made of camel-hair, tea, and Russian manufactures, as shagreen, broadcloth, satin, nankeen, china, glass, utensils of iron, copper, brass, cutlery, looking-glasses, needles, &c. Since the navigation on the Caspian Sea has increased, Russian goods are brought from Resht and Balfrush. From Herat are brought to Mushed, carpets, assafœtida, lead, saffron, pistachio-nuts, mastix, manna, gummi, ispiruck (a yellow dye), and caraway-seeds.

When the commerce of Gombroon was flourishing, a caravan-road led from that seaport to Kerman, and thence to Shiras, Ispahan, and Cashan, but that road is at present very rarely used. The great roads which lead over the mountains of Kurdistan from Teheran and Kazvin, either south-westwards through Hamadan and Kermanshah to Bagdad, or north-westward to Tabriz and thence to Erzerum and Sivas, are much frequented. A well frequented road leads also from Tabriz to Teflis in Georgia.

The foreign commerce of Persia is less important than the internal trade. Fraser, who had many opportunities of collecting information on that point, gives the following table:—

In the year ending May 31, 1821, the whole amount of exports from Persia to India at the port of Bushire, according to official reports, was stated at about . .	£305,000
That from Balfrush is estimated by the merchants there to be annually about 215,000*l*., but in order to include the whole remaining exports from Ghilan and Mazanderan, let it be stated at . .	250,000
Allow for exports from the smaller ports on the Persian Gulf, including the islands .	10,000
The commerce with Bagdad, which is considerable, particularly in silk, of which 12,000 maunds shohee are sent thither, may be taken at	200,000
That with the rest of Turkey, including a similar quantity of silk . . .	200,000
That with Teflis and Georgia . .	200,000
The exports to Bokhara and the states to the eastward	50,000
That with Arabia	10,000
	£1,225,000

According to this statement, Fraser finds that the exports of Persia are under a million and a half sterling. Though we think that nearly all his statements may be considered as approximations to truth, we must observe that he has omitted the exports to India by the way of Herat, and that he has also greatly underrated the exports of the places on the Caspian Sea, when he makes the exports from these harbours, excluding Balfrush, but including Resht, only amount to 35,000*l*. per annum. He himself states the export of silk from Ghilan to Astrakhan, in another of his numerous and instructive works on Persia, at 20,000 maunds shohee, and, according to his own statement, we must increase the second item of his list by at least 200,000*l*. The exports of Resht, besides silk, are rice, gall-nuts brought from Kurdistan, otter-skins, and cotton-cloth. The imports consist of iron, copper, hardware, looking-glasses, glass, cutlery, paper, tea, silver and gold wares from Moscow, and utensils of wood.

Government.—Persia is an absolute monarchy, in which the will of the sovereign is not, as in almost all the monarchical states of Europe, controlled and limited by institutions which have existed for a long time, and which cannot be infringed without exciting universal discontent. Institutions and a political order of this kind formerly existed, but they have been annihilated in the continual intestine wars which have desolated Persia during the last century. In Persia the word of the king is law, and the life and property of the subject are in his hands. He delegates his power to the governors of provinces, reserving to himself the power of life and death, with which he entrusts only the governors of the royal blood, and such persons as are sent to govern distant provinces or such as are in a state of rebellion. The governors of the provinces are called sardars, and those of smaller districts kulombegs. The tribes of the Iliyats however are not subject to these governors, but are under their own hereditary chiefs, who often pay very little respect to the orders of the king, whenever they think that they can do so with safety. The administration of the law is not exercised by the governors, but by courts. There are two different kinds of courts in Persia, the sherrah courts and the urf courts. The former decide matters according to the Koran and the traditional commentaries on it; the second, according to the customary laws of Persia. The limits between these two different kinds of law-courts are not fixed, but vary with the character and disposition of the sovereign. A sovereign of a strongly religious bias is inclined to refer all cases to the sherrah, while other sovereigns have tried to invest the urf courts with the chief authority. The supreme judge in the sherrah courts is the Sheik-al-Islam, who decides matters in the last instance, aided by the advice of the mooshteheds, or chief pontiffs. In every town there is such a judge, and in the larger ones also a cauzee, who is aided by a council of mollahs. The urf is administered by the king himself, and his governors and delegates. The courts are held in public, and the monarch sits for a certain time each day in his hall of audience, to hear appeals, to receive petitions, and to decide such cases as come before him.

The army of Persia consists of about 40,000 men regularly disciplined, of which only about 20,000 are organised on European principles. But the king can in a few weeks collect an army of 100,000 men, the greatest part of which number is supplied by the tribes of the Iliyats, and consists of irregular cavalry.

(Kinneir's *Geographical Memoir of the Persian Empire*; Ouseley's *Travels in various Countries in the East, more particularly Persia*; Morier's *Travels in Persia*, &c., and *Second Journey through Persia, Armenia*, &c.; Fraser's *Narrative of a Journey into Khorasan*, his *Travels and Adventures in the Persian Provinces on the Southern Banks of the Caspian Sea*, and his *Historical and Descriptive Account of Persia*; Conolly's *Journey to the North of India overland from England*; Burnes's *Travels into Bokhara*; Rich, *Narrative of a Residence in Koordistan*; Monteith, 'Journal of a Tour through Azerdbijan and the Shores of the Caspian,' in the *Lond. Geogr. Journal*, vol. iii.; Morier, 'Some Account of the Iliyats, or Wandering Tribes of Persia,' in the *London Geogr. Journal*, vol. vii.; D'Arcy Todd's 'Itinerary from Tabriz to Tehrán,' in the *Lond. Geogr. Journal*, vol. viii.; Shiel's 'Notes on a Journey from Tabriz through Kurdistan,' &c., in the *London Geogr. Journal*, vol. viii.; D'Arcy Todd's 'Sketch of a Part of Mazanderan,' in the *London Geogr. Journal*, vol. viii.; Thomson, 'An Account of the Ascent of Mount Demávend,' in the *London Geogr. Journal*, vol. viii.; Fraser's 'Notes on a Part of Northern Khorasan,' in the *London Geogr. Journal*, vol. viii.; Shiel's 'Itinerary from Tehrán to Alamut,' in the *London Geogr. Journal*, vol. viii.; Rawlinson's 'Notes on a March from Zohab to Khuzistan,' in the *London Geogr. Journal*, vol. ix.; Rawlinson's 'Notes on a Journey from Tabriz to Takhti-Soleïman,' &c., in the *London Geogr. Journal*, vol. x.; Stirling *On the Political State of the Countries between Persia and India*; Ritter's *Erkunde von Asien*, band vi.)

Language.—The history of the language of Persia, like that of the empire, may be divided into various periods, since, under each of the dynasties of which we have any remaining monuments, there was apparently a change in the dialect of the kingom. What this was in the infancy of the Persian empire is a point which, though often discussed, is far from being satisfactorily ascertained. Some say that the Zend and the Pehlvi were the two prevailing languages; the former being spoken in the north, the latter in the south. Others assert, not without foundation, that the Zend was not a vernacular but a sacred language, and that Zeratuhst, or Zoroaster, having composed in this language his book on religious and moral duties, entitled 'Zend Avesta,' two Pehlvi words which signify 'living soul,' the dialect in which that work was composed was called 'the language of the Zend;' while, if we are to believe Sir William Jones (*Works*, vol. iii., p. 113), who had it from a disciple of Zoroaster, *Zend* was the name of the character in which the books are written, and *Avesta* that of the language. [Zend.] Be this as it may, the Zend must have fallen into disuse at a very early period, being intelligible only to a few; since, in order to propagate the religious tenets of the *Zend Avesta*, the priests deemed it necessary to have the work translated into Pehlvi. It was undoubtedly extinct before the commencement of the vulgar æra, and we are told that among the *Guebres* of Guzerat, who still adhere to the doctrines of Zoroaster, there are few if any acquainted with it. As to the Pehlvi, so called either from the heroes or warriors who spoke it in former times, or from *Pahla*, the name for Media or Parthia among the natives, it was at first spoken nearly at the same time with the Zend, and attained to a high degree of perfection under the Sassanian kings. Indeed it was the common language of the nobility and the court, until, by the removal of the seat of the empire to the southern provinces, and the edict issued by Baharam Gour (A.D. 351), prohibiting the use of the Pehlvi in his dominions, that language gradually fell into disuse, and made way for the Parsi, or the idiom of Farsistan (Persis proper). This language, being more expressive and rich than the former, and being countenanced by the sovereign, and spoken by the courtiers, received the name of *Zeban Deri* (the language of the court), to distinguish it from that of the country where the Pehlvi and other rude dialects still prevailed under the generic denomination of *Zebán Parsi*. It has been lately asserted by an eminent philologist, Frank, that the Parsi is the mother of the Sanscrit; others, with Schlegel, maintain that the contrary is the case; but if we consider the greater simplicity of the Parsi, the former opinion seems the most probable. There can however be no doubt that the Zend, as well as the Parsi, has a common origin with the language of the Brahmans, while the Pehlvi is closely related to the Chaldee. Leibnitz has not hesitated to assert that the resemblance between the Teutonic languages and the Parsi was so great as to allow any German of education to understand at once whole Persian verses. After the conquest of Persia by the Arabs, Mohammedanism became the prevailing religion, and Arabic by degrees the language of the learned. At first it was cultivated for the purpose of reading the Korán. The addition not only of words, but of whole sentences, soon became a necessity, partly because words were wanting in Parsi to express many new ideas, and partly from an affectation of elegance, the Persian poets and rhetoricians striving to imitate the Arabian writers, whom they considered as their masters. The Arabic words thus introduced remained in some instances unchanged, or were merely altered in such letters as could not easily be pronounced; but in others they were changed and inflected according to the genius of the Parsi language. Thus was the modern Persian formed, which not only became general in all the provinces of Persia, but was also introduced into India by a descendant of Timúr, who founded the Mogul empire. But the old dialects of Persia were not entirely extinct. According to the reports of travellers, the Pehlvi is still spoken by the Buddars, a wandering tribe of Shirván, and by a few among the Guebres, or fire-worshippers; and some of the rude Kurdish dialects are considered to be pure Parsi. The modern Persian, though neither so rich nor so expressive as the Arabic, is more harmonious and better suited to all kinds of poetry. The prophet Mohammed was once heard to say that 'the language of Persia would be spoken in Paradise, owing to its extreme softness.' In the simplicity of its grammar it has been compared with the English; in its power of compounding words, with the German. The characters are the same as the Arabic, with the addition of four letters with three points. The Persian books are generally written in the sort of hand called *taalik*; although it is not uncommon to meet with works written in the *neskhi*, as the hand used by the Arabs is commonly called. Other systems or schools of writing seem to have been in use at various periods, such as the *Thuluth*, the *Rakaah*, and the *Tauki*, all of which however were founded upon the Arabic alphabet, and differed only in the shape of the letters.

To European students who wish to acquire a knowledge of the Persian language, the following elementary works may be recommended:—Sir William Jones, *Persian Grammar*, in the fifth volume of his *Works*; Gladwin's *Persian Moonshee*, Calcutta, 1801, in 4to. A new Persian Grammar, by Duncan Forbes and Sandford Arnot, Lond., 1828. Those of Lumsden and Richardson are also valuable works. In Germany, those of Dombay, Vienna, 1804, and Wilken, Leips., 1805-8, are most in use. Of Dictionaries we have, besides those of Meninski and Baretto, that of Richardson, reprinted by Wilkins, Lond., 1806, and the abridgment made by Hopkins, Lond., 1810.

Literature.—The literature of which the Magi were in possession, until the introduction of Islám, has scarcely anything to show in its old dialects, the Zend and the Pehlvi, but such parts of the books of Zoroaster as have been preserved, the commentaries upon the same, and the Persepolitan inscriptions, which are for the most part unintelligible. It is true, that during the reign of Nushirwán, surnamed 'the Just,' who lived at the close of the sixth century of the Christian æra, and was a liberal patron of literature, some works were written in the Pehlvi dialect, which were extant even after the time of Mohammed; but they have since perished. Of this number is a Pehlvi translation of a collection of moral fables, entitled the 'Fables of Bidpai,' which Barzuyeh, chief physician of Nushirwán, made from the Sanscrit by the orders of that monarch. [Bidpai.] Saad, one of Omar's generals, is likewise reported to have found in the tent of a Persian general, after the battle of Kádesiyyah, a history of Persia in the Pehlvi dialect, extracted from the annals of the Sassanian dynasty, and composed, it is believed, by the command of Nushirwán. As to the Deri or Parsi, after it became the language of the court, it was very much cultivated by the Sassanian kings and their vizírs, many of whom published works in it. Ardeshír Bábegán, the first prince of that dynasty, wrote the 'Kár-námeh,' or a journal of his achievements, as well as a work on morality, which was improved upon three centuries afterwards by Nushirwán. A vizír of this latter monarch, named Buzurj, wrote the '*Zefer Námeh*,' a work which is only known to us through the medium of a paraphrase made by the celebrated physician Avicenna (Ibn Sinnah), about the beginning of the eleventh century. During the first two centuries after the Mohammedan conquest, Persian literature was very little cultivated under the khalifs, who gave the preference to the Arabian. But when the power of the Abbásides began to decline, a number of independent princes arose in the different provinces of their empire, who vied with one another in promoting the cultivation of letters. The accession of the Bouyah family to the throne of Persia, in the tenth century, marked the great epoch of the revival of Persian learning. A sort of rivalship was then called forth by the fact of three contemporary princes, all lovers of letters, reigning at once in the provinces of Persia: Malek Shah Jelal-ed-din, king of Persia proper, of the dynasty of the Seljúkides; Kheder Ibn Ibrahim, sultan of the Ghaznevides; and Kheder Khán, king of Turkistan beyond the Gihon. To the united efforts of these three monarchs, and to their liberal encouragement of letters, the Persian literature may be said to have then been indebted for all its lustre. This flourishing state continued until the beginning of the thirteenth century, when the invasion of Genghis Khán gave a violent shock to all the arts of peace. Then came the invasion of Timúr-lenk in the fourteenth century; but that conqueror, far from discouraging polite literature, adopted the religion and the language of the country, and promoted the fine arts by his boundless munificence. The Turks themselves, who ravaged Persia during the ensuing century, greatly improved their harsh dialect, by mixing it with the language of that country, and one of their sultans, Mohammed II., who took Constantinople, is enumerated among the best lyric poets of Persia. In the sixteenth and seventeenth centuries, under the bloody reigns of the sultans of the house of Sefi, Persian literature sank to the lowest state; even the language was corrupted, and borrowed some of its terms from the Turkish, which was commonly spoken at court. Literature however seems to have somewhat recovered of late, if we are to judge from the works of Sheikh Mohammed Ali Hazín, which Belfour translated (Lond., 1830, 8vo.), and other writers of more modern times. We shall here give, from Sir William Jones, Von Hammer, and other authorities, a rapid sketch of Persian literature. Omitting however the numerous works on all subjects which fill the shelves of the public libraries in Europe, we shall confine our attention to a notice of those which are already known to Europeans either by extracts or translations. After Firdúsi, who wrote at the beginning of the eleventh century his celebrated epic poem entitled 'Sháh Námeh' (or book of kings) [Fir-

DUSI], came Ansarí, who has been called 'the king of poets,' and Asedí of Tús. In the same century flourished the celebrated Abú-l-ola, surnamed Alámí, from his blindness, who published some poems in which he professedly imitated the poets before Mohammed. Abú-l-ola left two disciples, Felekí, who wrote some excellent elegiac poems, and Ibráhím Khakání, who gained great reputation by his odes.

At the beginning of the twelfth century lived Anwarí [ANWARI], a native of Khorassán, and Reshidí Abd-el-Jelil, a native of Balkh in Khorassán. In the ensuing century, the city of Shiráz, which has not improperly been called the 'Athens of Persia,' gave birth to several distinguished poets. Of this number was the celebrated Sadí, who left behind him several works both in prose and in verse, the principal of which is entitled 'Ghulistán' (or bed of roses), a sort of mystic and moral poem, of which several editions and translations have been made. [SADI.] Contemporary with Sadí lived Feríd-ed-dín Attár, the author of a very valuable collection of proverbs, entitled 'Pendnameh' (the book of the council), a complete edition of which was published at Paris in 1819, under the superintendence of the late Sylvestre de Sacy, together with many others of his poetical works. Jelál-ed-dín Rumí, a native of Balkh in Khorassán, who died in 1262, is considered by the Persians as the most perfect model of the mystic school. His great work, entitled 'Mesnavi' (collection of distichs), is so difficult as to be scarcely intelligible without the help of a commentary. The city of Shiráz had also the honour of producing, in the fourteenth century, the most elegant lyric poet of Asia, Shems-ed-dín, surnamed Háfiz, whose works are sufficiently known to Europeans through the translations of Hindley, Rewiczsky, Jones, Von Hammer, &c. [HAFIZ.] Abd-er-rahman Ibn Ahmed, commonly called Nur-ed-dín Jámí, from Jám, his native city, the author of the 'Beharistán,' is also one of the most prolific and most pleasing of the Persian poets. To the same class belongs Abú Mohammed Nizámí, who flourished towards the close of the twelfth century, and is the author of five poems, three of which, 'Khosru va Shirín,' 'Leilah va Mejnún,' and 'Iskhander-nameh' (or the book of Alexander), are epic. Some tales and fables selected from one of his works, entitled 'Makhzen-al-asrar,' have appeared in the original and with an English translation in the 'Asiatic Miscellany,' Calc., 1786. Sheháb-ed-dín Abdallah Beyáni, surnamed Merwarídí, or 'the dealer in pearls,' owing to the sweetness of his versification, wrote a history of Shah Ismail, and a collection of odes and other poems, entitled 'Munis Al-ahbab' (the companion of the lovers), besides a metrical romance of Khosru and Shirin, which he left unfinished. He died in 1516. To the lyric poets of Persia belong also the Turkish emperor Selim I., the unfortunate Shah Allum, and Shah Feth Ali. Of less distinguished names, we might quote those of Khosru of Delhi, Abu Batta of Kermán, and Nání, by each of whom we have five long poems; Mir Ali of Shirván, Ahmed of Kirván, and the Amir Suleymán, each celebrated as the author of a history of Alexander (Iskhander-námeh); Sháhí, who was probably a pupil of Jámi, Hatefí, the emír Khosru, Senái, and Tefalí. The readers who wish to obtain information on the eminent poets of Persia and their works may consult the 'Beharistán' (or spring), by Jámí, some extracts from which were published in the 'Anthologia Persica,' Vindovonæ, 1778; the 'Kashfu-dh-dhanún' (or bibliographical dictionary) of Hájí Khalfah, now in the course of publication at Leipzig, with a Latin translation by Professor Fluegel; the 'Lives of the Persian Poets,' by Daulet Shah of Samarkand, and the continuation of Sám Mirza, entitled 'Tedhkirah ash-shoará' (see the extract from both in the 4th vol. *Des Not. et Ext.*); and lastly, the 'Ateskhede' (or temple of fire), by Loftali Beg, surnamed Azír.

The literature of the Persians abounds in prose fables and moral tales, mostly borrowed from the Indians. Of this class is a Persian translation of the fables of Pilpay, or Bidpai [BIDPAI], entitled 'Anwar-as-sohaylí.' Of the same kind is the 'Mufarraj-al-kolúb,' a version, or rather a paraphrase, of the Sanscrit Hitopadesa. Abú-l-fadhl, the vizir of the emperor Akbar, translated from the Sanscrit a collection of fables attributed to Vishnu Sarma, to which he gave the title of 'Iyár dánish.' The 'Bahar Danuch,' by Kinajut-ullah, was translated into English by Jonathan Scott, under the title of 'Garden of Knowledge,' Lond., 1799, 3 vols. 8vo. The same author published, in 1800, a collection of tales, anecdotes, and letters, translated from the Arabic and Persian. The 'Tootinameh' (or tales of the parrot), by Nakhshebí, were printed with an English version by Hindley, Lond., 1801, who translated likewise the 'Pendeh-i-Attar' (or counsels of Attar), Lond., 1809-14, 12mo. We have also the 'Bakhtyar Nameh' (or the story of Prince Bakhtyar and the ten viziers), by Sir William Ouseley, Lond., 1801, 8vo., Pers. and Engl. Langlés published likewise, in [illegible] his 'Contes, Sentences, et Fables, tirées des auteurs Arabes et Persans,' and Mr. Duncan Forbes has lately translated from the Persian a romance entitled 'The Adventures of Hatun Taï.'

In the department of history the Persians have produced some works which would do honour to any age or people. Mohammed Ibn Emir Khovend Shah, better known to Europeans as Mirkhond, wrote a work in several volumes entitled 'Ruzat-as-safá fi sirat al-Anbiya va-l-Moluk va-l-Kholafa' (or, the garden of purity, or the history of the prophets, kings, and khalifs), of which, besides the fragments given in Wilken's 'Chrestomathia Persica,' Leipzig, 1805, 8vo., several extracts have been published by Jenisch, Vienna, 1792. Jourdain (*Not. et Ext.*, vol. ix.) published in 1814, the history of the Ismaelites or Assassins of Persia, extracted likewise from the work of Mirkhond. De Sacy gave also a French translation of his history of the Sassanian princes in his 'Mémoires sur diverses Antiquités de la Perse' (Paris, 1793, 4to.); and Wilken published in Persian and Latin the history of the Samanides (Gött., 1808, 4to.). Lastly, our countryman Mr. David Shea has translated from the same sources, the 'History of Persia, from Kaiumars to the Death of Alexander the Great,' Lond., [illegible] 8vo. Mirkhond died in 1498. His son Khovend-mir Ghiyáth-ed-dín, commonly called Khondemir, who inherited his father's talents, wrote, besides the 'Kholassat-al-Akhbár' (or cream of the histories), a general history, entitled 'Habíbu-s-seyr' (the friend of the travellers), which, as well as the 'Ruzat-as-safá' by his father, was epitomised by Major David Price, in his 'Chronological Retrospect of Mohammedan History,' Lond., 1811-21, 4to. A translation of Tabarí's 'Chronicle,' a work of the greatest scarcity, in Arabic, was accomplished in the tenth century by Mohammed Balamí, a vizir of Nuh Ibn Nasr, the fourth of the Samanides. The first volume has been translated into French under the auspices of the London Oriental Translation Fund. The 'Lobb-tawárikh' (or marrow of history) by Yahya Ibn Abdallatif of Kazwín, who died in 1351, is also considered an excellent production. Abu Said Abdullah Al-beydawí wrote a universal history from Adam to his own times (A.D. 1276), entitled 'Nidhámu-t-tawárikh' (historical necklace), the eighth part of which, relating to China, was published in Persian and Latin by Müller, Berlin, 1677, 4to. Turán Shah, who died at Ormuz in 1377, wrote a 'Shah Námeh' (or book of kings), an abstract of which is given in the work of the Portuguese traveller Teixeira (*Relacion*, Amst., 1610). 'Matlaa-as-saadeyn' (the rising of the constellations) is a history of the kings of Persia of the family of Timúr, by an author of the name of Abd-er-razzák, whom Galland translated into French, but his version was never printed. Of Mohammed Kásim Ferishtá, an historian of the seventeenth century, we have a valuable work, part of which, on the history of Hindustan, was translated by Dow (Lond., 1768, 3 vols. 4to.), and part on the history of Deccan, by Jonathan Scott (Lond., 1794, 2 vols. 4to.). The entire work has since been translated by Major-Gen. Briggs (Lond., 1829, 4 vols. 8vo.), who has likewise published a lithographed edition of the original text. [FERISHTA.]

We are indebted to Sir William Ouseley for an epitome of the antient history of Persia, extracted and translated from 'Jehán Ara' (Lond., 1799), and to Gladwin for the 'Tuzuk-i-Jehánghir,' a very valuable work on the history and geography of Hindustan, attributed to the emperor Jehanghir. (*Asiat. Miscel.*) But by far the most important work on the history of India, written in Persian, is the 'Akbar-Námeh,' written, by the command of the emperor Akbar, by his vizier Abú-l-fadhl, who was put to death in [illegible]. The two first parts of this work contain a history of that sovereign and his predecessors; the third, entitled 'Ayeen Akbari' (or the institutes of Akbar), contains a geographical and statistical account of India, with much valuable information upon other interesting topics. An English version of the third part was published by Gladwin (Lond., 1777, 4to.; ib., 1800, 8vo.; and Calcutta, 1783-6). [AYEEN AKBERY.] There are also numerous works comprehending short periods of time, or the history of single dynasties and single reigns. The 'Tárikh Al-Mozaffer' contains a history of seven princes of the family of Mozaffer. Shah Baber, or Baber [Baber], the great-grandson of Timúr, left in the Mogul language some valuable commentaries respecting Hindustan, which were translated into Persian by Abd-er-rahim, and thence into English by Dr. Leyden and Erskine. Abd-er-razzâk wrote a history of Shah Rokh (Timúr's son) and his successors, as well as an account of his own embassy to China and Hindostan, a French translation of which has been inserted by Langlès in his 'Collection portative des Voyages' (Paris, 1797-1805, 8vo.). Mollah Sheref-ed-din Ali Jezdi, who died in 1446, wrote a biography of Timúr full of fables, which Petis de la Croix (François) translated into French (Paris, 1722, 4 vols. 12mo.). Sir William Jones published likewise a French translation of a history of Nádir Shah, written by his secretary Mirza Mohammed Mahadi Khân, who attended him in all his military expeditions. [Nadir Shah.] Gladwin translated a history of the same monarch, entitled 'Necessary Information,' by Abd-el-kerim of Cashmere, of whose pilgrimage to Mecca Langlès has given an abstract in his 'Collection.' A history of the same monarch, from Persian sources, was published by Fraser (Lond., 1742, 8vo.). Abú Tálеb Al-huseyni translated into Persian the 'Mulfoozat Timúry' (or institutes of Timúr), which this conqueror is supposed to have written himself in the Jagatai dialect. This work was first translated into English by White (Oxf., 1783, 4to.). It was then published in Persian and English by Stewart (Calcutta, 1785, folio); and lastly an English version by Stewart has appeared (Lond., 1830, 4to.).

In geography the Persians may be said to have derived most of their knowledge from the Arabs. They have a translation of the work of Ibn Haukal, an Arabian geographer of the ninth century [Haukal], as well as of the large work of the celebrated Kazwini, entitled 'Ajáyibu-l-makhlúkát' (the wonders of creation). They possess also a work entitled 'Heft Iklím' (seven climates), by Ar-razi; there is an English version of the first-mentioned work by Sir William Ouseley (Lond., 1800, 4to.). The same may be said of medicine. Geometry and astronomy seem however to have been cultivated by them with greater ardour. Násir-ed-din of Tús, the superintendent of the observatory and astronomical academy of Maragha, translated into Arabic the works of Euclid, which were afterwards commented upon by Mayrak Rashid. [Nasir-ed-din.] The latter author composed, at the command of Hulaku Ilekhan, the astronomical tables known by his name, but which were not completed until five years after that monarch's death (1263). Other tables were drawn up in the first half of the fifteenth century, by order of Ulugh-begh, which were afterwards published in Persian and Latin by Greaves and Hyde, under the title of 'Tabulæ Longitudinum et Latitudinum Stellarum Fixarum ex Observatione Vlug Beigi,' Oxon., 1665, 4to. A Persian calendar, under the title of 'Ruznameh nauruz,' was also printed in the collection entitled 'Vlug Beigi Epochæ celebriores,' Pers. et Lat., by Greaves (Lond., 1650). To the same class belong Bek's 'Ephemerides Persarum per totum Annum' (Vindobonæ, 1695, folio), and Welsh's 'Tabulæ Equinoctiales,' Augsburg, 1676, 4to.

The works on ethics are very numerous. We shall only mention the 'Akhlák-e-nasseri,' so called from its author Nasser-ed-din of Tus, a translation of which was lately announced by the Rev. G. Keene; and the 'Akhlák-e jelali,' published by the Oriental Translation Fund. The works on theology and jurisprudence are no less numerous. There is a Persian translation or abridgement of the Vedas, entitled 'Oupnekhat,' a French translation of which was published by Anquetil du Perron (Paris, 1804, 2 vols. 4to.). The 'Dabistan' was published at Calcutta, in 1811. The commentaries upon the Koran are chiefly in Arabic.

The Persians have paid great attention to their language, as the great number of grammars and dictionaries extant sufficiently shows. We might give the titles of many which have great reputation among the natives, but we shall merely notice the small Persian and Turkish dictionary of Shahidi, which however is only fit for beginners. That of Ardeshir has a higher reputation, as well as the 'Neamet-allah' (Grace of God), used by Castellus in the composition of the Persian part of his Lexicon Heptaglotton, Lond., 1669. But the most celebrated are the 'Ferhang Jehangiri,' by Jemal-ed-din Hossein Ibn Fakhr-ed-din, who dedicated it to the emperor Jehángir; the 'Ferhang Jewhari,' supposed to be a translation of the Arabic one, by Jouhari, which was published at Constantinople, in 1742; that of Seid Ahmed, printed at the same place, 1804; and the Persian dictionary, by the king of Oude, called 'The Seven Seas,' and published at Lucknow, in 1822, fol.

(Sir William Jones, *Works*, Lond., 1807; Sir William Ouseley's *Persian Miscellanies*, Lond., 1795; *Oriental Collections*, by the same, Lond., 1797; *Fundgruben des Orients*; *Notices et Extraits des MSS.*, &c.)

Religion.—Our knowledge of the religion of the antient Persians is principally derived from the 'Zendavesta,' or sacred books of the Persians, which were first made known to Europeans by Anquetil du Perron [Anquetil], and have been more fully explained and elucidated by Kleuker, Eugène Burnouf, Olshausen, Lassen, and other modern scholars. We learn from these books that the inhabitants of the antient Iran, which comprised Cabulistan, Sogdiana, Bactria, Media, and Persia, were originally one race of people, who spoke the same language and believed in the same religion. It was among them that Zerdusht, commonly called Zoroaster, arose, who must probably be regarded rather as a reformer of the antient religion than as the founder of an entirely new system. The time in which Zoroaster lived has been a subject of considerable dispute. Hyde and Kleuker suppose that he was contemporary with Darius Hystaspes; but others, with more probability, assign him a Bactro-Median origin, and suppose him to have lived long anterior to the time of Cyrus. But however this may be, his religious system became the dominant religion of Western Asia from the time of Cyrus to the conquest of Persia by Alexander the Great. Under the Macedonian and Parthian monarchies, the doctrines of Zoroaster appear to have been considerably corrupted by the introduction of foreign opinions; but on the re-establishment of the Persian monarchy by Artaxerxes in the third century of the Christian æra great exertions were made to restore the religion of the Persians to its primitive purity. The exercise of every other worship was strictly prohibited, and the religion of Zoroaster again became the dominant faith of the East, till the rise of the Mohammedan power, and the conquest of Persia by the Arabs in the seventh century, who compelled the greater number of the Persians to renounce their antient faith. Those who refused to abandon the religion of their ancestors fled to the deserts of Kerman and to Hindustan, where they still exist in the present day under the name of Parsees or Farsis, a name derived from Pars or Fars, the antient name of Persia. The Arabs call them Guebers or Khebers, which is derived from the Arabic *Káfir*, signifying an 'unbeliever.'

The principal doctrines of the religious system of Zoroaster may be explained in a few words. He taught the existence of an eternal, holy, and almighty being, who created two other mighty beings, and imparted to them as much of his own nature as seemed good to him. Of these, Ormuzd remained faithful to his creator, and was regarded as the source of all good; while Ahriman rebelled against his creator, and became the author of all the evil upon the earth. This doctrine of a good and an evil principle was the foundation of the whole religious system of the antient Persians. Ormuzd created man and supplied him with all the materials of happiness; but Ahriman marred this happiness by introducing evil into the world, and creating savage beasts and poisonous reptiles and plants. In consequence of this, evil and good are now mingled together in every part of the world; and the followers of good and evil —the adherents of Ormuzd and Ahriman—now carry on incessant war; but this state of things will not last for ever; the time will come, when the adherents of Ormuzd shall everywhere be victorious, and Ahriman and his followers be consigned to darkness for ever. [Ahrimanes.]

The religious rites of the antient Persians were exceedingly simple. They used neither temples, altars, nor statues, and performed their sacrifices on the tops of mountains. (Herodot., i. 131.) They adored fire, light, and the sun as emblems of Ormuzd, the source of all light and purity, but did not regard them as independent deities. The religious rites and ceremonies were regulated by a powerful sacerdotal class, called the Magi. [Magi.]

A full account of the religious usages of the Parsees of India is given by Herbert in his 'Travels,' and by Niebuhr. The practice of exposing the dead to be devoured by vultures, which is described by both of these travellers, agrees with what Herodotus (i. 140) says of the Magi, and also Strabo (p. 735, Cas.).

There are a few followers of the antient religion existing in the present day in Persia, but they are in a degraded and oppressed condition. Sir R. K. Porter remarks (*Travels*, vol. ii., p. 46), that 'from the restraints and fear under which they have been held for so many generations, both the doctrines of their faith and the most solemn rites of their worship have sunk into nothing more than a few hasty prayers muttered to the sun as supreme God: and what they call commemorative ceremonies are now only sad confused shadows of their former religious festivals.' At Bombay however the Parsees are a very active and rich class. They are in fact the proprietors of the greater part of the island. They are described by Lord Valentia (*Travels*, vol. ii., p. 174) as 'generous and splendid in the higher orders, and in the lower, active and intelligent, far surpassing as servants either Mussulmauns or Hindoos. They mostly speak English with propriety. In their persons they are a handsome race, fairer than the natives, though not possessing the clear skin of the Europeans. In their manners they are uniformly conciliatory and mild. They have numerous temples to fire, but their priests have no authority in temporal concerns, nor much spiritual control.'

(Hyde, *Veterum Persarum et Magorum Religionis Historia;* Rhode, *Die Heilige Sage der alten Baktrier, Meder, und Perser, oder des Zendvolks*, 1820; Gibbon's *Decline and Fall*, c. 8; Heeren's *Researches*, &c., 'Asiatic Nations,' vol. i., p. 366-392, Engl. transl.; Herbert's *Travels;* Niebuhr, *Reisebeschreibung nach Arabien*, &c., vol. ii.; Anquetil du Perron's, Kleuker's, Olshausen's, and Eugène Burnouf's editions of the *Zendavesta*.)

History.—The only credible and consistent account which we possess relative to the early annals of Persia is that derived from Grecian writers: for though a correspondence can perhaps occasionally be traced between these statements and the traditions of the Pishdadian and Kaianian dynasties preserved by Mirkhond and Firdusi, the incidents of the latter, and the marvellous exploits and length of reign (sometimes extended to three or four centuries) attributed to several of the monarchs, class them rather with mythological tales or romances of chivalry, than with the sober records of history. At the earliest period of which any trace is preserved, Persia appears to have formed a province of the great Assyrian empire, on the disruption of which it fell under the power of the Medes. Dejoces, the founder of the Median monarchy (about 709 B.C.), has been considered by some writers to be the Kai-Kaus of Oriental story: though others have held this name to be synonymous with Cyaxares, who, a century later, expelled the Scythians (or Trans-Oxian Turks) from Southern Asia. Astyages (Kai-Kobad?), the successor of Cyaxares, was dethroned (560) by Cyrus (Kai-Khosru?), who, according to Herodotus, was his grandson by his daughter Mandane, and who not only established the ascendancy of the Persians over the Medes, but by his victory over Crœsus, king of Lydia, which terminated (546) the dynasty of the Mermnadæ in Asia Minor, and by his conquest in 538 of Babylon and its dependencies, with Phœnicia, extended his empire to the Hellespont and the Syrian Sea. This great prince perished (529) in an expedition against the Scythians, probably beyond the Oxus; and was succeeded by his son Cambyses (529-21), who subdued Egypt. On his death the kingdom was usurped by a Magian, who personated Smerdis, the brother of the deceased monarch: but this impostor was destroyed by the nobles, who raised to the throne one of their own body, Darius Hystaspes (Gushtasp?). In his reign (521-485) the empire was divided into satrapies, and regular taxes introduced: Babylon revolted, and the walls were destroyed. And though a Persian expedition, under the command of Darius himself, against Scythia was a failure, the acknowledgement by Macedonia and Thrace of Persian supremacy extended the empire into Europe. The revolt of the Asiatic Ionians (501) and the aid given them by Athens, was the origin of the long wars of Greece and Persia. The defeat at Marathon (490) of a Persian force sent against Athens, showed the determination and military skill of the Greeks to be formidable; and hence resulted the famous expedition which, in 480, Xerxes, the son and successor of Darius (485-64), conducted in person against Greece. Herodotus states it to have consisted of above five millions of men, including an army of 1,700,000 infantry and 80,000 cavalry, and a fleet of 1200 ships. But this stupendous host, though it ravaged Attica and burnt Athens, sustained a signal naval defeat at Salamis: and the following year (479), after Xerxes had returned to Asia, the land and sea forces were discomfited in the two battles, fought on the same day, of Platæa in Bœotia, and Mycale on the coast of Asia Minor. The Persians were now driven from Europe; and Xerxes, who became more voluptuous and cruel after this disaster, was murdered by the captain of his guards (464).

During the long reign of his son Artaxerxes Longimanus (Ardashir Diraz-dast of Mirkhond, and probably the Ahasuerus of Scripture), the power of the empire greatly declined: the king was buried in the seraglio, while the distant satraps yielded only a nominal allegiance; Egypt was in continual revolt, and the Asiatic Greek cities were recognised as independent by the peace (449) which ended the Grecian war. The short reigns of Xerxes II. and Sogdianus occupy only a year (425): and the rule of Darius II., surnamed Nothus (424-405), presents only revolts at home and intrigues with Greece, where an alliance was formed with Sparta against Athens (411). Egypt threw off the yoke altogether in 414, and remained independent for sixty five years. Artaxerxes II., surnamed Mnemon, succeeded (405-359); and his younger brother Cyrus, attempting, at the instigation of their mother Parysatis (Peri-Zadah?), to dethrone him by the aid of an army of Greek mercenaries, was defeated and killed (401) at the battle of Cunaxa, in the plains of Babylonia, an engagement which was followed by the memorable Retreat of the Ten Thousand. In a war with Sparta, which commenced in 400, the integrity of the empire was threatened by the successes of Agesilaus, who, in three campaigns (396-4), advanced far into Asia: but by fomenting a coalition in the heart of Greece against Sparta, Artaxerxes was enabled, in 387, to conclude the advantageous peace of Antalcidas, by which Persia recovered the Ionian cities and Cyprus, though the latter was not reduced till after ten years' war. The accession of his son Ochus, or Artaxerxes III. (who confirmed his power by the slaughter of all his brothers), was followed by revolts in Asia Minor, Syria, and other provinces: but the former was betrayed by its leader Orontes, and Syria was reduced (351) by Ochus in person, who destroyed Sidon, and advancing into Egypt, expelled the king Nectanebus, and reunited that country to the Persian empire (350). After these successes, Ochus resigned himself to indolence and luxury, leaving the government in the hands of his favourite general, Mentor the Rhodian, and a eunuch named Bagoas, by the latter of whom he was poisoned in 338. Bagoas now placed Arses, the only surviving son of Darius, on the throne, but deposed and murdered him two years afterwards, when, the male line of the royal family being extinct, he invested Darius III., surnamed Codomannus (a great-grandson, by females, of Darius Nothus), with the vacant dignity. This prince commenced his reign (336-30) by ridding himself of the traitor Bagoas: but the invasion of his dominions by Alexander the Great, in 334, left him little opportunity for the exercise of sovereignty. By three great battles (Granicus, 334; Issus, 333; and Arbela, 331) the Persian empire was utterly overthrown; and the unfortunate Darius, flying from the arms of Alexander, was murdered (330) by his own servants, while the whole extent of his dominions from the Hellespont to the Indus fell under the sway of the Macedonian conqueror.

On the death of Alexander (323) and the dismemberment of his vast territories by his generals, Persia fell to the lot of the founder of the Syrian dynasty of the Seleucidæ, Seleucus Nicator (312-280), and remained in subjection during his reign and that of his son Antiochus Soter (280-61). But in the reign of Antiochus Theos (261-48), a germ of independence reappeared in the foundation of the *Parthian* kingdom in the country of Hyrcania (Deilem and Mazanderan) by Arsaces (Ashk?), the first of the house of the *Arsacidæ*, of which thirty monarchs reigned in succession, each bearing the title of *Arsaces*, in addition to his individual name. Arsaces I. reigned only two years (250-48), but his successor Tiridates I. (248-16) established his independence by defeating and taking prisoner (236) the Syrian king Seleucus Callinicus; and under Artabanus I. (216-196) this was confirmed by a treaty with Antiochus the Great. After the reigns of Priapatius (196-181) and Phraates I. (181-174), Mithridates, or Pacorus I. (174-136), extended the Parthian power to the Euphrates and the Indus, and, in 138, took prisoner Demetrius II. of Syria, who had invaded his territories; and the death of Antiochus Sidetes, who perished with his army (128) in an attack on Phraates II., deterred the Syrian kings from further aggressions. Phraates his successor Artabanus II. both fell in battle against the Trans-Oxians, or Turks; but these predatory hordes were repelled by Mithridates II., whose embassy to Sylla (92) was the first intercourse between Parthia and Rome. The reigns of Mnaskires (87-76), Sinatroces (76-69), Phraates III. (69-60), and Mithridates III. (60-54), were occupied by continual civil wars; but the sway of Orodes I. (54-37), who had dethroned and put to death his brother Mithridates, was distinguished by the first war with Rome, and the defeat and slaughter of Crassus with his legions on the plain of Carrhæ (53). In invading Syria and Asia Minor however, the Parthians were repulsed by Ventidius (39); but this defeat was avenged by Phraates IV. (B.C. 37, to A.D. 4) on Mark Antony, who only escaped from Parthia (36) with the loss of the greater part of his army. Some years later however Phraates opened diplomatic relations with Rome, and even sent his sons to be educated at the court of Augustus. The death of Phraates was followed by anarchy and dissension: Phraataces, Orodes II., and Vonones I. occupied the throne for short periods; and under Artabanus III. (14-44) the monarchy began rapidly to decline; the Romans even occupied the country for a short time, and proclaimed Tiridates, one of the Arsacidæ, as king; but Artabanus recovered his throne on the retreat of the Roman auxiliaries of the usurper. The reigns of Bardanes (Werdan?) (44-47), Gotarzes (47-50), and Vonones II. (50-52), contain nothing worthy notice excepting an unsuccessful attempt of the emperor Claudius to nominate a prince named Meherdates in place of Gotarzes; but under Vologeses I. (52-90) a long war with Rome was occasioned by disputes relative to Armenia, which were settled (65) by Tiridates, brother of Vologeses, accepting the Armenian kingdom as a fief of the Roman empire. The Roman alliance remained unbroken under Pacorus (90-107); but the reigns of Cosroes, or Khosru (107-121), Vologeses II. (121-149), Vologeses III. (149-191), and Vologeses IV. (191-209), were marked by almost continual wars with Rome. Ctesiphon, the capital of the Parthian empire, was taken and sacked by the emperor Septimius Severus in 199; and these contests, though they occasioned no loss of territory, greatly weakened the declining monarchy. Under Vologeses V. (209-16) civil wars were superadded to the attacks of the Romans; and his successor Ardwan, or Artabanus IV. (216-26), after maintaining himself for ten years against domestic revolts and foreign invasions, was defeated and killed, A.D. 226, in the last of three battles against Artaxerxes, or Ardeshir, surnamed Babegan, or the son of Babek, a native of Fars, or Persia Proper, who overthrew both the Parthian constitution and monarchy, and established, with the dynasty of the Sassanidæ, a new order of things in the East.

The erection of the *Sassanian* dynasty commences a new æra in the history of Persia (which antient appellation henceforward replaces that of Parthia), and from this period the native annals begin to supply comparatively authentic materials. The reign of Artaxerxes, or Ardeshir Babegan, after he attained undivided power (226-42), was occupied, excepting a short war with the Romans, in regulating his new dominions, and re-establishing in all its antient splendour the Magian faith, to the exclusion of all other religions; and his memory continued to be venerated as long as his descendants occupied the throne, both as the restorer of the Persian monarchy and religion, and as a legislator whose enactments and maxims of government were considered as the fundamental institutions of the country. His son Shahpoor, or Sapor I. (242-72), was a fierce and warlike prince, who conquered Armenia, and by his victory, in 260, over the emperor Valerian (who was taken prisoner, with his army, and died in captivity), taught the Romans to respect and fear the arms of Persia. Syria, Cilicia, and Cappadocia were laid waste with ruthless severity; Antioch was taken and plundered, but the latter part of his reign was less fortunate; Odenathus, prince of Palmyra, and his celebrated wife Zenobia, defied his arms, and Aurelian re-established the Roman frontier in the East.

The reigns of Hormuz or Hormisdas I. (273-4), of Varanes, or Bahram I. (274-7), Bahram II. (277-94), and Bahram III. (294), present no incident of importance except the unfortunate Roman war in the weak reign of the second Bahram, in which Persia was only saved from ruin by the sudden death of the emperor Carus. Narsi, or Narses (294-301), vindicated for a time the renown of the Persian arms by a signal victory (296) over Galerius; but in the next campaign the Persian forces were surprised and destroyed by the Romans, and, by the peace concluded in 297, Narses ceded Armenia and five provinces east of the Tigris. The reign of Hormisdas II. (301-9) was peaceful, but the long and splendid rule of his posthumous son and successor Shahpoor, or Sapor the Great (309-80), who was acknowledged as king even before his birth (Gibbon, ch. xviii.), revived the antient glories of the monarchy. His long war with the Romans (337-63) was contested with the whole force of the two empires, and with varied success. In the battle of Singara (348) Shahpoor triumphed over the emperor Constantius; and the invasion of Persia by his successor Julian, which threatened the dismemberment of the kingdom, was frustrated by the death of that prince and the cowardice of his successor, who purchased a safe retreat by the peace of Dura (363), which restored Armenia and all the cessions made by Narses, with the impregnable fortress of Nisibis. The wisdom of Shahpoor in government was equal to his valour in war; and the kingdom continued in peace and prosperity throughout the reigns of the next three monarchs, Artaxerxes or Ardeshir II. (380-85), Shahpoor III. (385-90), and Bahram or Varanes IV., surnamed Kermanshah (390-401), the founder of the city of that name. Yezdejerd I. (Isdigertes) engaged in no foreign wars, but his reign (401-21) was disturbed by religious dissensions: the Magi murmured at the toleration and favour shown by the king to the Christians, and his friendship for the Greek emperor Arcadius gave rise to the fable that the latter entrusted to him the guardianship of his son Theodosius; but the persecution of the Christians with which his son Bahram V., surnamed, from his love of the chase, Gour, or 'the Wild Ass,' commenced his reign, led to a short and indecisive war with the Romans. The subsequent sway of this prince was glorious and popular; after repulsing with great loss an invasion of the Turks of Trans-Oxiana, he extended his realm to the frontiers of India; and his extraordinary personal prowess has preserved his memory to the present day in Persia as a favourite hero of romance. He perished accidentally in hunting, leaving the crown to his son Yezdejerd II. (surnamed Sipah-Dost, or, the 'Soldier's Friend'), whose reign of sixteen years (442-58) was a period of peace and prosperity. On his death, his younger son Hormuz III. mounted the throne, but was speedily expelled by his elder brother Firouz, or Peroses, who had been furnished with an army by the Khan of the White Huns, or Turks of Trans-Oxiana. Firouz however returned this service by attacking the dominions of his benefactor: in his first invasion he was defeated and taken prisoner, but released by the generosity of the Khan. In a second attempt the Persian army was cut to pieces, and their perfidious king left among the slain, after reigning twenty four years (458-82). His son Palash, the Valens of the Greeks, reigned only four years; but his brother and successor Cavades, or Kobad (486-531), though his addiction to the libertine tenets of Mazdak cost him a four years' dethronement (497-501) in favour of his brother Jamasp, eventually retrieved the kingdom from the vassalage to the Huns, in which the fate of Firouz had left it, and waged a successful war with the Greek emperor Anastasius; and his son, the illustrious Khosru Nushirwan (531-79), raised the Sassanian empire to its highest pinnacle of grandeur and prosperity. For the details of his long and glorious reign we refer to the article KHOSRU. He carried his arms to the Mediterranean, the Euxine, the Sutlej, and the Jaxartes. Trans-Oxiana, the Punjab, and great part of Arabia, obeyed his mandates. Persia was divided into four great vice-royalties, and the excellence of the internal administration, in which the king was aided by his celebrated minister Buzurg-Mihir, has earned for him the proud appellation of 'Just.' But the last years even of Nushirwan were clouded by reverses, and his unworthy son Hormuz (579-90), after losing all the conquests of his father, forfeited his throne and life in a popular revolt headed by Bahram-Tchoubeen, a general who, after saving Persia from the Turks, had been basely disgraced by the king. Bahram attempted to ascend the throne, but Khosru *Perwiz*, son of Hormuz, easily recovered his inheritance (590-628) by the aid of the emperor Maurice, on whose dethronement and death (602) Khosru attacked the Roman empire, under the pretence of avenging his ally, and in sixteen years restored the Persian empire to the limits under Xerxes, by the conquest of Syria, Asia Minor, and Egypt; but these successes were transient, and Khosru, after having been in turn driven from his palaces by the victories of Heraclius, was murdered by his own son Shirouyeh or Siroes. The parricide survived his father only six months, and in four years of confusion and civil war the throne was filled by six kings and two queens, till the accession of Yezdejerd III., in the same year (632) in which Persia was attacked by the Arabs, then commencing the career of Mohammedan conquest. The fate of the kingdom, weakened by internal dissensions, was decided by the battles of Cadesia (636) and of Nehavend (641), the last of which, though the king survived in the condition of a fugitive ten years longer, subverted at once the Sassanian power and the independence of the country.

For more than two centuries after the Mohammedan conquest, the national history of Persia presents an entire blank. The Persians imbibed the religion and literature of the Arabs, to whom they imparted in return their civilization and luxury; but the country was only a province in the empire of the caliphs, and followed implicitly the revolutions of the Ommiyades and Abbasides. [ARABIA; ABBASIDES; MOORS.] But with the decay and division of the power of the Commanders of the Faithful, the spirit of independence revived, and the re-establishment of the kingdom may be dated from the foundation of the *Soffarian* dynasty by Yakub Ibn Lais, who about 868 threw off his allegiance to the caliph, and fixed at Shiras the capital of a dominion including nearly all Persia. But his brother and successor Amer was subdued, in 900, by the Tartar family of the Samanides, who ruled Khorassan and Trans-Oxiana till 999, while Western Persia again acknowledged for a few years a precarious allegiance to the caliph, till the utter disruption of the Abbaside power threw it, about 936, into the hands of the three sons of Bouyah, Amad-ed-doulah, Rukn-ed-doulah, and Moazz-ed doulah, who shared the kingdom among them; while the last-named occupied Bagdad, and exercised, under the title of Emîr-al-Omarâ, absolute control over the person and remaining territory of the caliph. After the death of Amad-ed-doulah, nearly all the dominions of the *Bouyah* (sometimes called *Deilemi*) dynasty were reunited under his nephew or successor Adhad, or Azed-ed-doulah, one of the greatest and most virtuous princes of his time, whose reign of thirty-four years (949-82) is the æra both of the grandeur of his family and of the prosperity of Persia. His successors again divided the kingdom, and wasted their strength in internal dissensions, during which a number of petty principalities rose to independence. One principal branch of the Bouyahs continued however to retain Bagdad and the dignity of Emîr-al-Omarâ, raising and deposing the pontiff-caliphs at their pleasure; but the other, which ruled in Eastern Persia, was subdued, in 1028, by Mahmood, who thirty years earlier had founded the mighty dynasty of the Ghaznevides in Cabul and Khorassan, on the ruins of the Sassanian power, and had carried the Moslem arms, for the first time, into the heart of India. All Persia seemed on the point of falling into the hands of this conqueror and his family, when the prize was snatched from their grasp by the descent from Central Asia of the *Seljookian* Turks, who, originally received as vassals by the Ghaznevide princes, soon asserted their independence, and after defeating Massood, the son and successor of Mahmood, A.D. 1040, in a great battle near Nishapur, compelled the Ghaznevides to confine themselves to Afghanistan and their Indian conquests, and placed their own sultan, Togrul-Beg, in possession of Persia, to which (1055) he added Bagdad and Irak, with the guardianship of the caliphate, deposing the Emîr-al-Omarâ Malek-Raheem, the last of the house of Bouyah. The reigns of Alp-Arslan, the nephew and successor of Togrul (1063-72), and his son Jelal-ed-deen Malek Shah (1072-92), raised the Perso-Turkish monarchy to the highest pitch of splendour and glory. [ALP-ARSLAN.] The Greek emperor Romanus was defeated and taken, and Armenia subdued by Alp-Arslan: the rule of his son extended over great part of Syria, Arabia, and Tartary, while internal prosperity was secured by the wise administration of the famous vizier Nizam-al-mulk; and the reformation of the calendar, by the establishment of the Jelalæan æra (March 15, 1079), shows that the progress of science kept pace with that of conquest. But the unity of the empire was dissolved at the death of Malek Shah: his sons divided and disputed the provinces of Persia; minor branches ruled in Kerman, Anatolia, and Syria; and when Sandjar, the youngest and most warlike of the sons of Malek Shah, succeeded, about 1120, in establishing his own supremacy over most of the eastern parts, the provinces of Azerbijan, Fars, Laristan, &c., were virtually independent under petty princes bearing the Turkish title of *atabek*, who, from being lieutenants of the sultan, had aspired to hereditary rule; while in the mountain country immediately south of the Caspian, the infamous sect of Ismailis, or Assassins [ASSASSINS], had subsisted from the time of Malek Shah. After the death of Sandjar (1156) civil wars recommenced among the Seljookian princes, of which the caliphs availed themselves to recover from them the exclusive possession of Bagdad and and Irak; and though Togrul III. reunited (1175) the remaining provinces, he was overwhelmed and slain (1194) by Takash, shah of Kharism, a former dependency of the Seljookian empire, the viceroys of which had thrown off their allegiance during the reign of Sandjar, and had gradually subdued Trans-Oxiana and Khorassan. Persia now fell under the yoke of the Kharismian sultan, who by the destruction, a few years later, of the Ghaurides (a dynasty which had supplanted the Ghaznevides in Cabul), extended his sway from the Caspian and the Sea of Aral to the Indus and the Persian Gulf. But this mighty power was of short duration: Mohammed, the successor of Takash, became embroiled, through the misconduct of the governor of Otrar, with the ruler of the Moguls beyond the Jaxartes, the redoubtable Gengis-Khan, who in 1218 invaded his dominions with a host of 700,000 men, and in two campaigns drove Mohammed to take refuge in an island of the Caspian, where he died in 1220. His son Jelal-ed-deen Mankberni, a celebrated paladin of Eastern story, maintained for some years a gallant but unavailing struggle, till his death, in 1230, finally dissolved the Kharismian power, and laid Persia prostrate at the feet of the Moguls.

The conquest of Persia by the Seljookian Turks had been softened by their community of faith and their speedy adoption of the manners of the south, but the Moguls detested and despised alike the Moslem faith and the refinements of civilization, and their progress was everywhere marked by merciless slaughter and devastation. On the death of Gengis, Persia fell to the share of his grandson Hulaku, who, in 1258, took and sacked Bagdad, putting to death the last of the Abbasides, and massacring, according to Persian historians, 800,000 inhabitants of the city. The dynasty of *Hulaku* ruled Persia about eighty years. Abaka, his son and successor (1264-82), extended his authority over the Seljookian princes of Anatolia, and formed alliances with the Christians for the recovery of Syria and Palestine; but his armies sustained several signal defeats from the Mamelukes, and of the short reigns which follow, that of Key-Khatu also deserves notice for an unsuccessful attempt (1294) to introduce into Persia a paper currency, which already existed in China. The invasion of Syria was renewed, but again without success, in the reign of Ghazan (1295-1303), who first threw off the nominal allegiance which his predecessors had hitherto paid to the grand khan of Tartary, and embraced, with all his subjects, the Moslem religion. His brother and successor Aljaptu, or Mohammed Khoda-bandah (1303-1[illegible]), founded the celebrated city of Sultaniyah, which he made his capital; but the hereditary Mogul nobles were gradually absorbing all the power of the state, and Abou-Said Bahadur, the son of Aljaptu, and eighth in succession from Hulaku, was the last of his race who enjoyed any authority, though several pageant monarchs were afterwards elevated for short periods. Persia was now divided and distracted by numberless petty dynasties, perpetually at war with each other. The Il Khanians, who possessed Bagdad, Irak, Azerbijan, &c., were perhaps the most powerful of these princes, while the Modhafferians ruled over Fars and Shiras; the Sarbedarians, Molouk-Kurt, &c., occupied Khorassan and the neighbouring parts; and hordes of marauding Turkomans, the origin of the present clans of Persia, roamed over the country, uncontrolled by any [illegible] rulers.

Such was the state of Persia when a new conqueror appeared from Tartary, in the person of the famous Timur-lenk, or Tamerlane, who speedily involved all the contending parties in one common ruin. Already master of Trans-Oxiana and Tartary, he invaded Khorassan, in 1381, at the head of a force which produced the instant submission of all the petty princes in that quarter; and in twelve years from this time, though frequently recalled into Tartary to repel the attacks of the khan of Kipzak, he had subdued and devastated the whole of Persia, meeting with little determined resistance except from the gallant Modhafferian prince of Shiras; his overthrow was followed by the slaughter ([illegible]) of 70,000 inhabitants of Ispahan, whose heads were piled in pyramids by order of Timur; and Bagdad, though saved the first instance by the submission of the people, who refused to defend their tyrannical sovereign Ahmed Il-Khani, shared a similar fate in 1401, as a punishment for its revolt against Miran Shah, the son whom Timur had left to govern Persia. The pursuit of some of the Turkoman tribes brought him in contact with the Ottoman Sultan Bayazid; but his victories over the Turks and the Mamelukes of Syria do not come within the scope of this sketch. He died near Otrar, in 1404, as he was on the point of setting out for the conquest of China: his empire, upheld only by the terror of his name, fell to pieces almost instantly, and Persia, in a few years after his death, had relapsed into a state of division and anarchy even worse than that which had preceded his irruption. His son Shah Rokh indeed, who ruled over Khorassan, Trans-Oxiana, and Tartary (1409-46), exercised during his life a paramount authority over great part of the country, and more than once repressed in arms the depredations of the Turkomans; but the sway of his descendants was limited to Trans-Oxiana and Eastern Khorassan, which they held till expelled by the irruption of the Uzbeks at the end of the century, while the western provinces were contested by two races of Turkomans, distinguished by their emblems of the *black* and the *white sheep*. Kara Yusef, the founder of the former race, had been an antagonist of Timur, after whose death he attained considerable power (1407-20); but his successors wasted their strength in domestic quarrels, till they were overwhelmed and extirpated (1469) by Uzun Hassan, or Hassan the Tall, ruler of Diarbekr, of the *white sheep* dynasty. Uzun Hassan was a wise and valiant prince, and succeeded in making himself master of the greater part of Persia; but, encountering the superior power of the Ottoman Sultan Mohammed II., he sustained a signal defeat in Anatolia (1473). He was nevertheless preparing to enter into a league with Venice, the Rhodian knights, and the sultan of Egypt, against the preponderating power of the Porte, when death put an end to his projects (1478); and his relatives and descendants, after disputing for several years the possession of his extensive territories, were finally supplanted and crushed (1502) by the first of a race of sovereigns whose character and rule imparted to the Persian monarchy a greater degree of stability and more settled forms of government than it had for some centuries enjoyed.

Ismael Shah, the founder of the *Sefi, Sooffee, or Seffaveean* dynasty (whence the common appellation of *Sophi*, applied to a Persian monarch), was remotely descended from the caliph Ali, the cousin and son-in-law of Mohammed, and more immediately from a race of ancestors whose hereditary reputation for sanctity was of great service, both in his own ascent to the royal dignity and the subsequent long retention of it by his family. From the red cap which he introduced as the distinctive head-dress of his people, the Persians derived the epithet of Kuzzil-Bash (Red Heads), by which they have been ever since known; but their adhesion at this period to the Sheah or heterodox sect of Islam has been the origin of their national enmity to the Turks, who hold the Sooni or orthodox persuasion. The greater part of his reign (1502-24) was employed in the reduction of the various provinces of his kingdom. By a great victory, in 1510, over the Uzbeks, he stopped their career of conquest, and confined them to the other side of the Oxus; but he sustained a severe defeat, in 1514, from the Turks under Selim I., though he subdued Georgia a few years later. The long reign of his son Tahmasp I. was occupied principally by wars against the Uzbeks and Turks, the latter of whom several times invaded Persia, and once penetrated to Ispahan; but the boundaries of the two empires were fixed, in 1555, by a peace which has been the basis of all subsequent treaties. The embassy of Anthony Jenkinson (1562) was the means of opening commercial relations between England and Persia; but the chief glory of Ismael's reign, in the estimation of Oriental writers, was the munificent hospitality which he extended to the Mogul emperor Humayoon, when driven from India by a rebellion. The reigns of Ismail II., son of Tahmasp (1576-7), and his brother Mohammed Khuda-bundah (1577-85), present nothing worthy of note except the renewal of the Turkish war; but under the rule of Abbas the Great, son of Mohammed (1585-1627), the Seffaveean dynasty attained its zenith of power and renown. [ABBAS.] After totally expelling the Uzbeks from Khorassan, in the first part of his reign, he turned his arms against the Turks, over whom (having equipped, by the aid of two English travellers, the brothers Shirley, a corps of 12,000 musketeers) he gained repeated victories from 1602 to 1618, in which year a peace was concluded, restoring to Persia all her former possessions. In order to promote manufactures, he invited Armenian artificers to settle at Julfa, and formed an alliance with the English, by whose aid he expelled the Portuguese from Ormuz; he removed the capital from Kazwin to Ispahan, and greatly improved the internal communications of the kingdom; but in his old age he grew suspicious and cruel, and his last years were embittered by regret for the loss of his eldest son, whom he had unjustly put to death. His grandson and successor Shah Soofi I. (1627-41), was a cruel and drunken tyrant; the warlike Ottoman sultan, Mourad IV., availing himself of his incapacity, recovered most of the Turkish losses, and took Bagdad in 1637, after which a peace was concluded, restoring the boundaries as in 1555, and giving up the acquisitions of Abbas the Great.

The reign of Abbas II. (1641-66), and his son Soliman or Shah Soofi II. (1666-94), are almost destitute of events in their foreign relations, which continued uniformly peaceful. Commerce and the arts flourished during this period; many European travellers, as Tavernier, Kæmpfer, Chardin, &c., visited Persia, and embassies from many foreign powers appeared at Ispahan, particularly a splendid mission, in 1672, from Louis XIV. of France; but the court was sunk in indolence and luxury, and the warlike spirit of the people had greatly declined from inaction. The first part of the reign of Shah Sultan Hussein (1694-1722) passed also in tranquillity; but this was only the calm which precedes a storm. The character of the king, a weak and bigoted though amiable prince, surrounded and governed by mollahs and eunuchs, promised impunity to revolt or aggression. Georgia, Laristan, and other remote provinces rebelled and were reduced, but the revolt of the Afghans of Cabul and Candahar, in 1709, had more formidable consequences. Their chiefs, Meer-Weis and his successor Meer-Mahmood, repelled with loss all the attacks of the Persians; and in 1720 Meer-Mahmood, encouraged by the spectacle of weakness which the monarchy presented, invaded the country with 25,000 men; and in 1722, after routing the Persians at Goolnabad, under the walls of Ispahan, invested the capital, which, after enduring for several months all the horrors of famine, was forced to capitulate. Hussein resigned his crown to the conqueror, placing the royal aigrette with his own hands in the turban of Mahmood, October 23, 1722; and Persia, after having been ruled 220 years by the family of Ismael Sooffee, thus fell under the yoke of the Afghans.

The crown-prince Tahmasp however held out in Armenia, and Russia and the Porte, taking advantage of the confusion which prevailed, formed the design of dismembering Persia by seizing the districts adjoining their own territories. A partition treaty was concluded for this purpose, and Tahmasp, in 1723, actually ceded the Caspian provinces to Russia, in return for a promise of aid, which was never fulfilled; while on the other hand Meer-Ashraf (the cousin and successor of Mahmood, who died raving mad in 1725) gave up, by the peace of Bagdad (1727), Azerbijan, Khuzistan, and Irak to the Turks, who in return acknowledged him king of Persia. But the progress of Tahmasp and his great general Nadir-Kooli was fast destroying the brief tenure of the Afghans in Persia, though they strove to maintain it by dreadful massacres of the nobles and disaffected citizens. Ashraf was driven from Ispahan by Nadir, in 1729, and killed, after a second defeat, in 1730. The invaders were everywhere exterminated, and Shah Tahmasp re-occupied Ispahan. But all the real power remained in the hands of Nadir, who in 1732 dethroned Tahmasp for concluding an ignominious peace with the Porte, elevating his infant son Abbas III., in whose name he governed as regent, and after expelling the Turks from their conquests, concluded a peace in 1736, re-establishing the ancient frontiers of Turkey and Persia, while the districts ceded to Russia were recovered by treaty. Abbas died the same year, on which Nadir formally declared the Seffaveean dynasty at an end, and himself assumed the crown under the title of Nadir Shah.

This extraordinary man raised Persia, for a short time, to a higher degree of power than she had possessed since the rule of the Sassanian kings. He conquered Candahar and Afghanistan; and in invading India, in 1739, took Delhi, and carried off a booty estimated at 32,000,000*l.*, reducing the next year the Uzbeks of Khiva and Bokhara, long the enemies of Persia. A second war with the Porte (1743-6) terminated favourably to Persia; but the barbarities and avarice of Nadir exasperated his subjects, and he was murdered in his tent, 1747. [NADIR SHAH.] His death was the signal for a scene of anarchy and confusion; the Uzbek states threw off the yoke, and Afghanistan became an independent and powerful kingdom under Ahmed Doorauni, while the crown of Persia was contested by various competitors, and the kingdom torn by civil war, till a chief named Kereem Khan, of the Zend family, succeeded, in 1759, in possessing himself of supreme power, which he held till his death, in 1779, under the title of Wakeel, or Administrator, refusing the insignia of royalty. His sway was mild and equitable; he repressed the depredations of the Turkoman tribes which, under Nadir, himself a Turkoman and a Sooni, had overspread Persia; and he concluded advantageously a short war with the Porte. But fresh troubles broke out at his death,—six chiefs, between 1779 and 1789, ascended or claimed the throne, while Russia took advantage of the prevailing anarchy to encroach on the northern provinces, taking Georgia under her protection in 1783. The candidates for royalty were at length reduced to Lutf Ali Khan Zend and Aga-Mohammed Khan Kajar; the former, a brave but cruel prince, bore the title of king from 1789 to 1795, when he was taken and put to death by his rival, who thus became sole monarch, and the founder of the Kajar or reigning dynasty. He fixed his capital at Teheran. His first act was to attack the revolted Georgians, whom he overthrew in the field, and subjected their capital, Teflis, to ruthless pillage and massacre; but his severity provoked his own attendants to assassinate him, and he was succeeded by his nephew, the late Shah Futtah Ali (1797-1834). The early part of his long reign was marked by the rival intrigues of France and England at his court with reference to India. The principal subsequent events were his two disastrous wars with Russia, the first of which (1804-13) ended in the cession of most of the Caspian provinces by the peace of Goolistan; the second (1826-8), in the resignation of Eriwan and the country to the Araxes, by the treaty of Turkmanchai. He however reconquered Khorassan from the Afghans and Uzbeks, and broke the power of the chiefs of tribes by appointing his own numerous sons to nearly all the governments. At his death a struggle for the crown commenced among his descendants, but was speedily terminated, by the influence of England and Russia, in favour of the present Shah Mohammed, grandson of Futteh Ali by his son Abbas Mirza, who had been declared crown-prince, but died before his father. The reign of this young prince has not hitherto been auspicious; he appears to have thrown himself blindly into the arms of Russia, and the unsuccessful expedition which he undertook, in 1838, against the Afghan prince of Herat has not only exhausted his resources, but placed him in an attitude of hostility to the British power in India. Such is the present political position of Persia, of which the progress of time alone can develop the consequences; but the reduced power of the kingdom, and its situation between the two mighty and increasing Asiatic empires of England and Russia, of one of which it must virtually remain the vassal, apparently preclude the possibility of its ever again holding its former important rank in the scale of nations.

PERSIAN GULF, a large closed sea, connected with and consequently constituting a portion of the Indian Ocean. The entrance from that sea is by the strait of Ormuz, which in the narrowest point, between Ras Koli (or Cape Koli), in Persia, and Ras Mussendom, in Arabia, is about 38 miles wide. The gulf extends between 24° and 30° N. lat. and between 48° and 58° 30′ E. long. Its general form is that of a curve, the convex side of which is turned to the south-east. The direct distance between Ras Mussendom and the mouth of the Shat-el-Arab, which enters the most north-western extremity of the gulf, is about 550 miles; but measured along the curved line of the gulf, it is 600 miles. In width it varies between 40 and 200 miles, the greatest width occurring between 54° and 52° E. long. The average width exceeds 100 miles, and the area is about 70,000 square miles. The islands which are dispersed over this gulf are estimated at about 1400 square miles.

The navigation of this sea is dangerous and tedious, owing to the numerous shoals and reefs. These shoals and reefs are much more numerous on the southern or Arabian coast, which can hardly be approached in any part by large vessels without the greatest care, and it was accordingly for a long time the refuge of pirates, who by their boldness and activity increased the danger of the navigation in his sea. The most daring of these pirates were the Jawasimi, who had their principal station on the Arabian coast, at Ras-el-Khyma, about 60 miles from Ras Mussendom, and who were only compelled to keep the peace by two expeditions sent against them by the English from Bombay, in 1809 and in 1819. The navigation along the northern coast is comparatively free from danger, and the shoals are not very numerous. The largest are those which surround the western part of Kishm, and render the strait which separates that island from the continent so intricate; and the Berdistan Reefs, which render the coast of Persia, between 51° and 52° E. long., inaccessible to vessels above the size of a boat. In all other places, with some few exceptions, the soundings are regular, on a muddy or sandy bottom, and vessels, in case of necessity, find safety either in some of the small bays, or under the small islands, which are numerous along this coast. The places which are most resorted to by the shipping are the anchorage between the island of Ormuz and the town of Gombroon, the small bays of Mogoo and Bender Chetwar, the roadsteads of Busheer, and north of that town, the bay of Jenabe and Ras Dilem.

The prevailing wind during the whole year blows from the north-west. It is only during the months of November, December, and January that southerly winds may certainly be expected, especially in the Strait of Ormuz, where gales from the south-west and south-south-west are sometimes experienced. In other seasons of the year southern winds are of short duration, and they are constantly followed by north-western winds, the duration and force of which are always proportionate to the time that they have been interrupted by the southern winds. The Arabian navigators have observed that the northern winds blow regularly at certain seasons. They call them *shemaal*, and distinguish the great and the little shemaal. The great shemaal blows with considerable force for about forty days in June and July, but it it is not steady, being interrupted by calms and light winds. The little shemaal continues to blow for twenty days in March and April, with great force and without interruption. After this wind has blown four or five days, a strong current begins to run against it, which carries vessels daily twenty miles westward. This is produced probably by the accumulation of the water in the narrow, long, and curved strait by which the gulf is connected with the ocean. No other winds in this sea are steady except those which blow from the north-west, and sometimes those from the south-east. The rest are feeble, uncertain, and change frequently. The southerly winds blowing in winter are frequently accompanied with heavy rains, but the rains diminish towards the north, so that at Bassora, on the Shat-el-Arab, very little rain falls. These winds rarely last more than three or four days, and do not extend to the north-western part of the gulf.

Before the entrance of the gulf, between Cape Jask and Muscat, the currents are variable and uncertain, and usually subject to the wind (from the north-west); they set to the leeward. But sometimes they set against the north-western and northern winds, and thus cause what are called races. They run with more velocity along the shores than in the middle of the sea. It is stated that in the Strait of Ormuz itself, the current, from May to September, runs into the gulf, and in the remainder of the year out of it. Within the gulf, from Ras Mussendom to the mouth of the Shat-el-Arab, the current runs in the middle of the sea eastward; but it is often feeble, and sometimes it sets to the north. But a current is frequently met with along the coast of Persia which sets westward for several days together. Vessels therefore which sail to the west, keep close to the Persian shores, where, besides these currents, they are favoured by the land-breezes, which are not regular, but occur from time to time. The Arabian navigators are very expert in taking advantage of these circumstances.

The most remarkable of the numerous islands which are dispersed along the shores of the gulf are Ormuz [ORMUS], Kishm, Kaës, Busheab, Bahrein [BAHREIN], and Karej. Kishm is the largest island in the gulf, being miles long, and in the broadest part twenty miles wide. The surface is stated to exceed 500 square miles. On the southern side a ridge of hills extends from one extremity to the other, while the remaining space to the northward is occupied by arid plains and deep ravines. The greater part of the island is sterile, and in some places encrusted with a saline efflorescence, but there are also extensive tracts of fertile ground. The population exceeds 5000. K[illegible] the capital, at the eastern extremity of the island, is a place greatly resorted to by native vessels. It has a bazar, wel supplied with fruits and provisions, and some large and well built houses; the population is 2000. Laft, on the northern coast, on the channel which divides the island from the continent, was once the resort of pirates, but is now nearly abandoned. At Basidoh, or Bassadore, not far from the western extremity of the island, the East India Company had an establishment during the survey made by them of the gulf (from 1821 to 1828). Rice is cultivated, and date-trees are numerous. The island of Kaës, or Kenn, is small, the area hardly exceeding five square miles, but it is well cultivated, and produces wheat and tobacco. It has a small town, and a harbour for native vessels, which is frequently resorted to. The island of Busheab contains about forty square miles. It is uncultivated, but produces dates, and abounds in goats. It has a small town, and a harbour at the western end on the north side, where there is good anchorage for vessels of large burthen. The island of Karej, or Kharrack, contains about 26 square miles, and is surrounded by reefs, except at its north-eastern extremity. It is elevated, and visible at a considerable distance. The date-groves are extensive, and there is abundance of good water. Vessels sailing to Bassora obtain pilots here, who conduct them through the dangerous shoals at the mouth of the Shat-el-Arab.

Fish abound along the shores of the gulf; and fish and dates constitute the principal articles of food of the population. Nearly the whole population of the Arabian shores of this sea get their means of subsistence by the pearl-fishery. The most extensive pearl-fisheries are those on the several banks not far from the island of Bahrein; but pearl oysters are found, more or less, along the whole of the Arabian coast, and round almost all the islands of the gulf. Such as are fished in the sea near the island of Kharrack contain pearls which are said to be of a very superior description, but the water is too deep to make fishing for them either very profitable or easy near that island. At Bahrein alone the annual amount of the pearl fishery may be reckoned at from 1,000,000 to 1,200,000 German crowns (the coin current there), or from 200,000*l.* to 240,000*l.* The smaller fisheries, at Aboothatu, Sharga, Ras-el-Khyma, may produce half that sum, so that the whole produce may be between 300,000*l*, and 360,000*l.* About 1500 boats are employed in this fishery, and each contains ten persons, five divers, and five 'syebors,' or pullers-up.

The shores of the gulf are low, except near the Strait of Ormuz, where the mountains on both sides of Ras Mussendom rise to a considerable elevation, and come close up to the sea. This high coast extends within the gulf about [illegible] miles, and then the mountains on the Arabian shore recede to a great distance, leaving a wide plain which extends to the very mouth of the Shat-el-Arab. This plain is sandy, and produces only in a few places dates and a little grain. It is not known to what distance from the shores this plain extends. On all parts of the northern or Persian shore, mountains are visible from the sea. In some places they retire to a distance of 30 miles from the coast, and at others they approach it within three miles. These mountains are of moderate elevation, and in general do not much exceed 3000 feet above the sea, though a few summits rise higher, among which the highest is Mount Halaïlah or Ha[illegible], at the back of Cape Berdistan, which is supposed to attain a height of 5000 or 6000 feet. The low plain which lies between the shores of the gulf and the mountains is arid and sandy, and in many places swampy, but exceedingly hot. It produces very little grain, but dates in abundance, and is called by the natives Dushtistan or Gurmsir. Only one river of importance enters the Persian Gulf, namely, the Shat-el-Arab, which is formed by the confluence of the Tigris and Euphrates, and falls into the most northern recess of the sea by six or seven channels, of which however only the most western, called Cassisa Boni, or [illegible]ra river, is navigable for vessels of considerable burthen. The plain which here borders on the Persian Gulf extends eastward on the banks of the rivers to the mountain-ranges which surround the Black Sea on the south. The largest river next to the Shat-el-Arab is the Tab, which falls into the gulf not far from the most eastern mouth of that river; its course is probably less than 100 miles in length, and it is only navigable for boats of 20 tons burthen to the town of [illegible]an, 16 miles from the mouth.

It is remarkable that the shores of this gulf, in their whole extent, are inhabited by one nation, the Arabs. The Arabs are in possession of the whole country to the south of the gulf, which is also called Arabia; but on the northern shore they occupy only the Dushtistan, or low plain; the mountains at the back of it, as well as the table-land of Iran, which lies behind these mountains, being in possession of the Persians. As the low plain is inhabited exclusively by Arabians, one of the sovereigns of Arabia, the iman of Muscat, has succeeded in establishing his authority over nearly the whole extent of it, at least as far west as Ras Berdistan, and the king of Persia has left him in possession of it, but the iman pays him an annual rent.

The earliest navigation of this gulf which is on record is the voyage of NEARCHUS.

(Horsburgh's *India Directory*; Kinneir's *Geographical Memoir of the Persian Empire*; Berghaus, *Geo. Hydrographisches Memoir vom Persischen Golf;* Kempthorne's 'Notes made on a Survey along the Eastern Shores of the Persian Gulf,' in the *Lond. Geogr. Journal*, vol. v.; Wilson's 'Memorandum respecting the Pearl Fisheries in the Persian Gulf,' in the *Lond. Geogr. Journ.*, vol. iii.; Whitelock's 'Descriptive Sketch of the Islands and Coast situated at the Entrance of the Persian Gulf,' in the *Lond. Geogr. Journal*, vol. viii.)

PE'RSICA. [PEACH.]

PERSICA'RIA is the garden name of a species of Polygonum (P. orientale), a handsome annual, growing about six feet high, and strikingly ornamented with drooping clusters of pink flowers. It is very different from the Polygonum Persicaria, a wild acrid plant, growing in ditches, and of no great beauty.

PERSI'COLA, Schumacher's name for one of the *Marginellinæ*. [VOLUTIDÆ.]

PERSIMON is the fruit of the *Diospyrus Virginiana*, a tree inhabiting the United States of America, especially the southern, where it becomes 60 feet or more in height, with a trunk 18 or 20 inches in diameter. It has ovate-oblong taper-pointed shining leaves, pale yellow flowers, and a succulent reddish fruit about as large as a small plum, and containing a few oval stones. After having been exposed to frost, it becomes sweet, but, like our medlars, is astringent and uneatable at an earlier period. In the American nurseries is a sweet Persimon, said to be superior in quality to the wild kind. It is eaten both by man and wild and domestic animals; it is also pounded, dried, and made into cakes, or it is bruised and fermented, and yields by distillation an ardent spirit. Its timber too is strong, elastic, and of considerable value. The bark, which is very bitter, is said to be tonic. In Great Britain it has long been cultivated, and there are fine specimens at Kew, Lynn, and elsewhere. Its fruit is however seldom produced. The Persimon is very nearly the same as the Lote or Date Plum of Switzerland, which is the *Diospyrus Lotus.*

PE'RSIUS, AULUS FLACCUS, a Roman satirist, was born at Volaterræ, a town of Etruria, about the 20th year of the reign of Tiberius, A.D. 34. He was of equestrian rank. At the early age of six years he lost his father. His mother, who was afterwards married to another Roman knight, appears to have bestowed extraordinary care upon Persius; and he appears to have shown towards her the strongest filial affection.

Persius was trained at Volaterræ till his twelfth year, and he then proceeded to Rome, where he studied grammar under Rhemnius Palæmon, and rhetoric under Virginius Flaccus. At the age of sixteen he became a pupil of Annæus Cornutus, a Stoic philosopher, who had come from Leptis in Africa to settle at Rome. Lucan, the poet, was his fellow-disciple in the school of Cornutus. Persius and Cornutus were bound to each other by feelings more like those of father and son than such as usually subsist between preceptor and scholar. This friendship continued without interruption till the death of Persius, which took place in his 28th or 30th year. He bequeathed his books and a large sum of money to Cornutus, who however declined to receive the latter, and gave it up to the sisters of Persius.

The materials for a life of Persius are scanty; but they are sufficient to show him in a very favourable light. Amidst prevailing corruption, he maintained a high moral character. He consistently applied his principles as a Stoic to the purposes of self-discipline. His acquaintance with men and things was the result of private study more than of actual converse with the world, so that, as his writings testify, he viewed human life as he thought it should be, rather than as it really was. Different opinions are formed of Persius as a satirical poet. Quintilian and Martial, with some of the early Christian writers, bear a high testimony to his merits, as do likewise several modern critics. Others consider him not worth reading. Gifford, who has studied him thoroughly, says, among many eulogies of him, 'His life may be contemplated with unabated pleasure; the virtue he recommends, he practised in the fullest extent; and at an age when few have acquired a determinate character, he left behind him an established reputation for genius, learning, and worth.'

The works of Persius consist of six Satires with a prologue, which seems however not a very suitable introduction either to the first satire or to the six satires taken as one work. The metre of this prologue, which comprises 14 lines, is of the kind called choliambic (lame iambic), or scazon (halting), of which kind are seven of the poems of Catullus. The Satires contain altogether only 650 hexameters; and in some manuscripts they are given as one continuous work. Whether Persius wrote more than we now possess, as the author of his life attributed to Suetonius affirms, we know not; but since Quintilian and Martial speak of his claims to distinction, though he left 'only one book,' we should conclude that no other production of his was known in their time.

Much has been said respecting the obscurity of Persius, and it has even been stated that he meant not to be easily understood. It is not very likely that a man ever wrote seriously with the intention of being obscure. It is granted that Persius is obscure; but he was, no doubt, plain enough to his contemporaries, who were acquainted with the principles of the Stoic philosophy, and with the persons and things generally referred to. Modern readers without such a key will of course find difficulties in Persius. Commentators have however thrown much light upon this author, and among them Isaac Casaubon may be mentioned first; but his comment is copious enough to frighten most readers of the present day. The comment of Koenig is briefer. 'But that of Bond may be recommended as the best, particularly because it comes directly to the point, and brings forward short passages from other writers in such a way as greatly to illustrate the phraseology of Persius.' The English reader may derive a correct idea of Persius from the translation and notes of Gifford.

The best editions of Persius are those of Isaac Casaubon, revised by his son Meric, London, 1647; Bond, Norib., 1631; Koenig, Gött., 1803, and with Rupert's *Juvenal*, Glasg., 1825. English translations have been made by Holyday, Dryden, Brewster, Sir Wm. Drummond, and Gifford.

(*Life of Persius* attributed to Suetonius; Fabricius's *Bibliotheca Latina*; Ruperti; Koenig; Gifford.)

PERSONAL ACTIONS. [ACTIONS.]

PERSONALTY AND PERSONAL PROPERTY. [CHATTELS.]

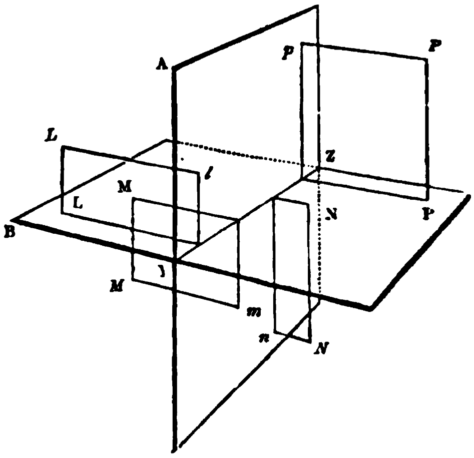
PERSPECTIVE, a term popularly given to an application of geometrical principles, by means of which a *pictorial* outline of a certain class of objects may be delineated on a plane surface. It is consequently connected with the arts of design. [DRAWING.] Perspective constitutes however only a specific case of a more general application of the principles alluded to, which enable us to make constructions relating to geometrical *solids*, bearing the same relation to geometry of three dimensions that practical bears to theoretical plane geometry.

The analyst, in his investigations of symbolical expressions for the relations of geometrical magnitudes, refers these, according to the species of magnitudes under consideration, either to co-ordinate lines on a plane, or to co-ordinate planes, assumed at pleasure in space. [CO-ORDINATES.] The draughtsman, or practical geometrician, makes his constructions on the lines and figures themselves, when they lie wholly in one plane; and when he has to make constructions on geometrical solids, he is compelled to refer the various points, lines, and figures connected with or constituting those solids to one or more planes, to effect his object; and from constructions on these planes he can determine the unknown quantities of the original solids by means of their *projections*, as they are termed, knowing the conditions under which these projections were obtained.

1. The series of points of any geometrical solid are most simply supposed to be referred to a plane by parallel right lines, passing through them perpendicular to the plane; the intersections of these lines with the plane are termed the *projections* of the original points on that plane.

2. Let us conventionally designate the original points by Italic capital letters, and their projections by Roman letters: thus *P* means a point in space, *p* its projection on a plane.

3. The points *l*, *m*, *n*, on a plane AYZ, are therefore understood as referring to points in space, situated in right lines passing through *l*, *m*, *n* respectively, perpendicular to that plane; but these projections alone do not define the relations between the original points; for *l*, *m*, *n* are each the projections of an infinite number of original points, all in short through which each *projecting line* may pass. To define the specific points *L*, *M*, *N*, we must consequently not only have *l*, *m*, *n*, but the lengths respectively of the projecting lines *Ll*, *Mm*, *Nn*, or the distances at which *L*, *M*, *N* are respectively situated from their projections.



4. This second series of essential data is furnished by projections L, M, N of the original points on a second co-ordinate plane BYZ, perpendicular to the first, and therefore parallel to the former projecting lines, by which *l*, *m*, *n* were determined; while, conversely, the first plane must be parallel to the projecting lines by which L, M, N are determined. For if a third plane be conceived to pass through the two projecting lines *L*L, *Ll*, of any point *L*, and therefore necessarily perpendicular to the two co-ordinate planes, the intersections of this third plane with the two latter will, together with the two projecting lines themselves, form a rectangle; consequently the distance of any projection L from the common intersection YZ of the co-ordinate planes is equal to the length of the *projecting line Ll*, which is parallel to it; while, conversely, the distance of the other projection *l* of the same point *L* from the same common intersection is equal to the length of the *projecting line* L*L*.

5. Let us designate the third plane just described as the *projecting plane* of an original point. It follows as a corollary from this definition of the plane, that the *projecting planes* of a series of points L, M, N are parallel to each other, and perpendicular to both co-ordinate planes, as well therefore as to the common intersection YZ of those co-ordinate planes.

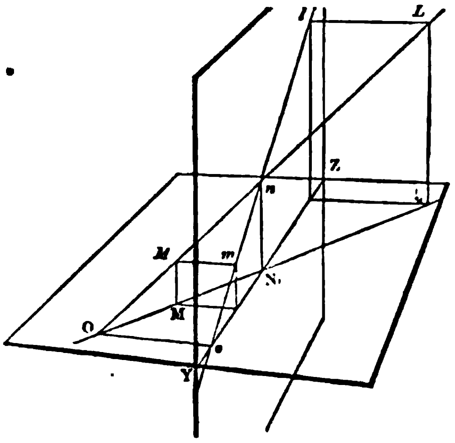
6. Let YZ always designate the common intersection of the two co-ordinate planes; let the projections L, M, N be termed the *plans*, and the projections *l*, *m*, *n*, the *elevations* of the original points *L*, *M*, *N*. It follows that if an original point lie in either co-ordinate plane, its projecting line will coincide with that plane, and its projection on the other will be a point in YZ.

7. Let us next consider a right line *LM*, supposed to join or pass through two points in space *L*, *M*. Then the right line LM, joining or passing through the *plans* of *L* and *M*, is called the *plan* of *LM*, and *lm* is the *elevation* of the same original line.

8. It is obvious, from the preceding definitions, that the *plan* and *elevation* of any original right line *LM* in space are the intersections with the co-ordinate planes respectively of two planes passing through the original line perpendicular to the co-ordinate planes.

9. We will distinguish the projecting plane of an original line *LM*, by which the *plan* of that line may be conceived as produced, as the *plan-projecting plane* of *LM*; and the projecting plane by which *lm* is produced, as the *elevation-projecting plane*. But the reader must not confound the *projecting plane* of an original point, which is necessarily perpendicular to both co-ordinate planes, with the *projecting*

plane of an original line; which, though necessarily perpendicular to one co-ordinate plane, may be parallel, perpendicular, or oblique to the other, according as the original line is parallel, perpendicular, or oblique to that other co-ordinate plane. Nevertheless the projecting plane of an original line will always intersect that co-ordinate plane, to which it is not necessarily perpendicular, in a line which is perpendicular to YZ.



10. Besides the plan and elevation, there are two other elements regarding an original line which it is necessary to consider; these are the points in which that line itself intersects the two co-ordinate planes. The principles of projection furnish us with the following theorems relating to these points, and to the plan and elevation of the line.

11. If the original line be parallel to both co-ordinate planes, it can intersect neither, and both its plan and elevation are parallel to YZ. It is clear, on this supposition, that the original line is itself also parallel to YZ.

12. If the original line be perpendicular to one, and therefore parallel to the other co-ordinate plane, the projection on that other plane will be parallel to the original, and perpendicular to YZ, while the projection on the first will be a point, that in which the original line itself intersects that co-ordinate plane.

13. If the original line be oblique to one, and yet parallel to the other co-ordinate plane, its projection on that to which the line is *not* parallel will be parallel to YZ; while its projection on the co-ordinate plane, to which the original is parallel, will cut XZ in the projection of the point in which the original intersects the former co-ordinate plane.

14. If the original line be oblique to both co-ordinate planes, neither its plan nor elevation can be parallel to YZ; the plan of the line will cut YZ in the projection of the point of intersection of the original with the co-ordinate plane in which its elevation lies; while that elevation will cut YZ in the projection of the intersection of the original with the plane in which the plan lies.

15. It also follows that the projecting line of the point in which an original line intersects either co-ordinate plane coincides with the intersection of the projecting plane of that line.

16. If an original line, oblique to both co-ordinate planes, lie in a plane perpendicular to them both, its plan and elevation will both be perpendicular to YZ, since its two projecting planes will coincide with that in which the line lies. In this case the plan and elevation could not furnish sufficient data for determining the original lines, since they would be common to every line, in the perpendicular plane, which was not parallel to either plane of projection; if however we have, in addition to the indefinite plan and elevation of the line, those of two points in it, or the two points in which the original line cuts the two co-ordinate planes, then the original line is determined.

17. Let us next consider in what manner an original plane may be conceived to be referred to two co-ordinate planes. It is clear that as only one plane can be drawn through a straight line and a point, or, which is the same thing, through the two legs of a plane angle, the plans and elevations of any two lines through which the plane passes will determine it. But the intersections of the original plane with the two co-ordinate planes furnish a datum regarding it of more direct application.

18. The intersections of an original plane with the co-ordinate planes are termed its *traces*.

19. The traces of a plane on either co-ordinate plane will obviously pass through the points in which two or more lines lying in the original plane intersect that co-ordinate plane.

20. If an original plane be parallel to one co-ordinate plane, its trace on the other will be parallel to Y Z.

21. If an original plane be perpendicular to either co-ordinate plane, its trace on the other will be perpendicular to YZ, at the point in which the trace on the first plane meets that line; and the plane oblique angle formed by the trace and YZ will be the measure of the dihedral angle formed by the original with the other co-ordinate planes. If an original plane be perpendicular to a co-ordinate plane, its trace on that plane will be the common projection of all lines in the original plane, and will pass through the projection of all points in that original plane.

22. If the original plane be parallel to YZ, its traces on the co-ordinate planes will both be parallel to YZ, and therefore to each other; but in every other case, if the original be oblique to both, or meet both co-ordinate planes, its traces on them must intersect in a point of YZ. And if the plane be perpendicular to both co-ordinate planes, both its traces will be perpendicular to YZ.

23. If two original lines are parallel, the plans of those lines will be parallel, as will also be their elevations: but the plans or the elevations only of two lines may be parallel, although the lines themselves are not so, the parallelism of either the plans or elevations simply arising from the accidental parallelism of the plan or elevation projecting planes of the original lines.

24. An analogous theorem applies to two original planes: if these be parallel, their traces on both co ordinate planes will be parallel; but if their traces are parallel on one plane only, it simply indicates that the original planes intersect each other in a line parallel to that co-ordinate plane.

25. The plans of two lines may cut one another, as may also the two elevations, and yet the originals may not lie in one plane, and therefore cannot meet each other. If two original lines really intersect, the points in which the plans and elevations cut each other must lie in the projecting plane of the point in which the originals meet.

26. The projections of equal parallel lines will be equal parallels, in the ratio to the originals of the cosine of the angle in which those originals are inclined to the plane of projection, to radius. If two lines forming an angle be parallel to two others, whether lying in the same or different planes, the projections of each two lines will form equal angles.

27. The plane angles, which are the projections of equal angles, will be equal, provided the original angles are similarly placed with respect to the traces of the planes in which those originals lie; or else when the original angles lie in a plane parallel to either co-ordinate plane, and then the projected angles must be equal to the originals.

28. Hence, since the projection of every parallelogram is a parallelogram (23), the angles of the projection corresponding to the adjacent angles of the original figure will also be complementary to each other.

29. If an original plane and line be mutually perpendicular, the projection of the line will be perpendicular to the trace of the plane on each co-ordinate plane. For since the projecting plane of the line must, on this supposition, be perpendicular both to the original and to the co-ordinate plane, and consequently so to their common intersection, which common intersection is the trace of the plane, this projecting plane will cut the co-ordinate plane in a line, namely the projection of the original, perpendicular to the trace of the plane.

30. If a line in an original plane be parallel to a co-ordinate plane, the projection of that line will be parallel to the trace of the plane; and conversely, if the projection of a line situated in a plane be parallel to the trace of that plane, the original line is parallel to the co-ordinate plane in which that trace lies.

31. These theorems on projections would be useless to the practical geometrician so long as the co-ordinate planes are supposed to retain their relative situation in space: to enable him to make the requisite constructions on the projections, and to determine the unknown magnitudes entering into the original solids by means of the projections of the known ones, he supposes the one co-ordinate plane turned

round on the common intersection YZ till the two planes coincide in one and the same plane: by this supposition the relations to YZ of the lines, points, and traces, on the plane which is supposed to be turned round, remain unaltered; while the principles on which the projections are made allow of the correct interpretation of the new relations which the projections of original points and lines on one plane assume with regard to the projections of the same points and lines on the other plane, when these two co-ordinate planes are supposed to coincide in one.

32. The same method of bringing two planes into one may be applied, or rather conceived to be applied, to the *projecting plane* of any original point or line, this projecting plane being supposed turned round on the projection of the line till the plane coincide with the co-ordinate plane, that is to say, a construction can be made with the projection of a line founded on this supposition, by which a line may be found representing the original line as brought into the co-ordinate plane; and by an analogous construction, an original plane may be constructed as if turned round on its trace till it coincide with the co-ordinate plane.

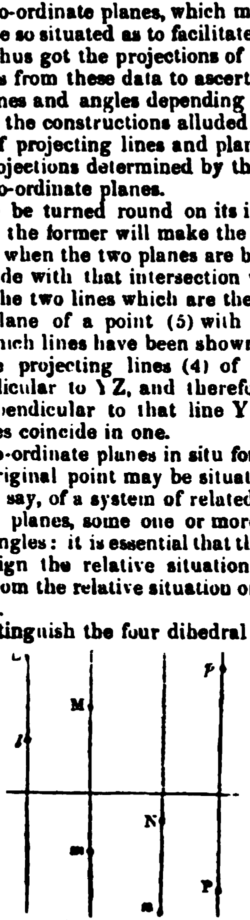
33. This principle may be carried still farther: thus a construction can be made, founded on the supposition that an original plane has been turned round on its intersection with another such plane till they coincide, and this compounded plane, if we may use such an expression, has been again turned round on its trace till it has been brought into the common plane of projection.

34. It must hence be understood that the practical application of the theory of projections is entirely synthetical, that is, the draughtsman, first drawing a line to represent YZ, proceeds from this simple assumption to draw the projections of certain points and lines of a solid, on which he proposes to operate, from their known, assumed, or given relations to each other, and from their conventional relations to the supposed co-ordinate planes, which may in every case be conceived to be so situated as to facilitate these constructions. Having thus got the projections of known or given lines, he proceeds from these data to ascertain the absolute magnitudes of lines and angles depending on these given ones, by making the constructions alluded to, founded on the supposition of projecting lines and planes being turned round on the projections determined by them, till they coincide with the co-ordinate planes.

35. If a plane be turned round on its intersection with another, a line in the former will make the same angle with that intersection, when the two planes are brought into one, that the line made with that intersection when the planes were in situ. The two lines which are the intersections of the projecting plane of a point (5) with the co-ordinate planes in situ, which lines have been shown to be equal respectively to the projecting lines (4) of that point, will be both perpendicular to YZ, and therefore will coincide in one line perpendicular to that line YZ, when the two co-ordinate planes coincide in one.

36. The two co-ordinate planes in situ form four dihedral angles, and an original point may be situated in any one of these: that is to say, of a system of related original poin s referred to those planes, some one or more may be in different dihedral angles: it is essential that the learner should know how to assign the relative situation of the original points in space from the relative situation of their plans and elevations to YZ.

37. Let us distinguish the four dihedral angles thus:—

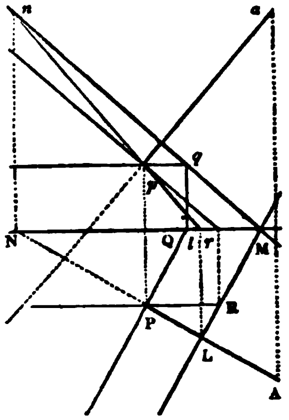


1. $+x+y$; the point P,p[*] is in the dihedral angle No. 1.
2. $-x+y$; „ L,l „ „ No. 2.
3. $-x-y$; „ M,m „ „ No. 3.
4. $+x-y$; „ N,n „ „ No. 4.

38. Our limits will only admit of two or three examples of elementary constructions to illustrate the subject of projections, referring to the theorem on which each step of the construction is founded.

Given a point P,p *in a given line* AP, ap, *to draw a plane through* P,p *perpendicular to the given line.*[*]

39. Draw a line PQ through P, perpendicular to the plan of the line, for that of a line parallel to the co-ordinate



plane, and lying in the plane sought; then (20) pq, parallel to YZ, will be the elevation of this parallel. The line PQ, pq meets the co-ordinate plane in Q,q (13), q therefore will be a point in one trace of the plane sought: and since this trace must be perpendicular to the elevation of the line, M n drawn through q perpendicular to ap will be that trace. The same construction, applied, mutatis mutandis, to the other projection of the point, will furnish a point in the horizontal trace of the plane sought, which trace must be drawn through R perpendicular to AP. The two traces thus found will intersect each other in a point of YZ (22).

Given a plane LM, Mn, *and a point* A,a: *to draw a line through the point perpendicular to the plane, and to determine the point in which this line cuts the given plane.*

40. Through A,a draw lines perpendicular to the given traces LMn for the indefinite projections of the perpendicular sought (29): from the point N, in which AN cuts YZ, draw N n perpendicular to YZ for the intersection with the other co-ordinate plane of the plan-projecting plane of the perpendicular (9); and from L, in which AP cuts ML, draw L l perpendicular to YZ: the point l is the elevation of the point in which the plan-projecting plane of the perpendicular cuts the trace LM, M l; and n is that in which the same plane cuts the trace M n. Consequently n l is the elevation of the intersection of the same plan-projecting plane with the original plane. Now it is obvious that the point sought must lie in this intersection; consequently the point p, in which ap cuts nl, must be the elevation of the point in which the perpendicular intersects the given plane.

41. The plan P of the point may be obtained by drawing Pp perpendicular to YZ (35), to cut AN, the indefinite plan of the line; or by applying the foregoing construction, mutatis mutandis, to the other projections.

To draw a line through a given point P,p, *to make any proposed angle with a given line* AB, ab.

42. If the proposed line is to be *parallel* to the given one, lines drawn through the projections of the given point, parallel respectively to those of the given line, will be the projections of the line sought (23); but if the lines are not to be parallel, join P,p with any two points A,a, B,b, taken at pleasure in the given line. ABP will therefore be the plan, and abp the elevation of the triangle thus formed. Find the traces, ML, Ln, of the plane of this triangle, by

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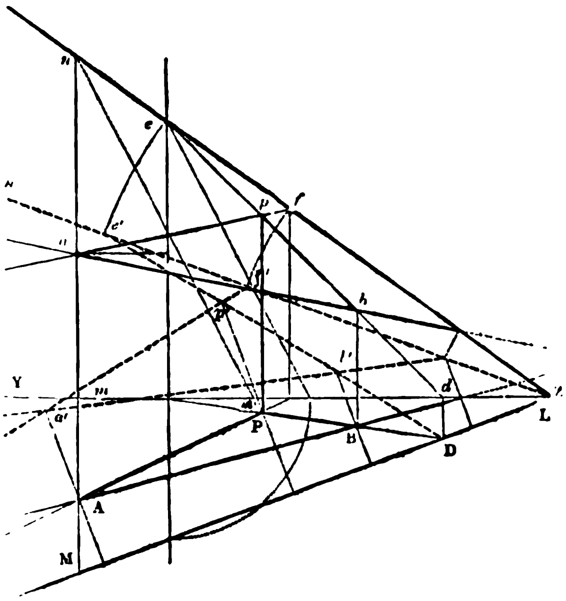
[*] 'The point P, p,' 'the line AB, ab,' 'the plane LM, Mn,' signify the point, line, or plane, the plans, elevations, or traces of which are A,a; A B, ab; LM, Mn, respectively.

[*] This is the form of enunciation of a prob. in solid geometry, and is to be thus interpreted: Given the projections P and p, on two co-ordinate planes supposed to be brought into one, of a point P situated in an original line of which the corresponding projections, AP ap, are given; to draw the lines (traces) which will represent the intersections of a plane with those co-ordinate planes, this plane being supposed to pass through P, and to be perpendicular to *AP*.

finding the points in which any two of its sides intersect the co-ordinate planes (19), since these points must lie in the traces required.*



43. Draw M*n* perpendicular to YZ, to cut the traces anywhere at pleasure in points M, *n*; the line M*m*, *n* is consequently the traces of a plane assumed at pleasure as perpendicular to both co-ordinate planes (22), and cutting the given plane ML*n* in a line, the projections of which, of course, coincide with the traces of the plane. The length of this line, or the real distance between the points M*n* when in situ, is obtained by making mm' in YZ equal to *m*M; then the hypothenuse $m'n$ is the intersection of the given plane with the assumed plane, brought into the plane of projection by the rotation on *mn* of this assumed plane.

44. From M and L, as centres, with $m'n$, L*n* for radii respectively, describe arcs cutting in n'. Join Mn', Ln'; the triangle MLn' consequently (32) represents that portion of the given plane ML*n* intercepted between the co-ordinate planes and the line M*m*, *mn*, brought into the co-ordinate plane by being turned round on the trace ML, and by this rotation, bringing the original of the triangle, PAB, *pab*, along with it. To draw this triangle as thus brought into the co-ordinate planes, produce PB, *pb* to cut the two traces in D and *e* respectively, make Le' equal to L*e*, join De'. In the same manner the lines $a'p'$, $a'b'$ are obtained, constituting the original triangle as brought into the co-ordinate plane in the manner described.

45. The points A,*a*, B,*b*, P,*p*, lying in the original plane, will describe arcs of circles during the rotation of that plane on its trace: the planes of these circles must obviously be perpendicular to the original plane and to the co-ordinate plane, and consequently cut the co-ordinate plane in lines or traces perpendicular to ML, that of the original plane. Hence if lines be drawn through A, B, and P, perpendicular to ML, they will pass through a', b', and p', since the traces of these planes will be the projections of all lines lying in them, and therefore of the circular arcs alluded to (21) in which the points a', b', and p' lie. By this means the points a', b', and p' may be found, or verified if previously obtained on any other principle.

46. Draw $p'a'$ to make the proposed angle with $a'b'$†; then the plan A, and elevation of the point a', in which the proposed line meets the given one in the given angle, may be determined from a' by the converse proceeding to that by which a', b', and p' were obtained. And lastly, PA, *pa* will be the projections of the line as required.

47. The foregoing construction might have been made with the trace L*n* instead of LM; but the triangle, when brought into the co-ordinate plane on the supposition of the rotation of the plane of that triangle on L*n*, would not coincide with $a'b'p'$.

48. If a line be conceived to move always perpendicular to a co-ordinate plane, and pass through an original curve, its intersection with the plane will be the projection of the curve; this projection being the section of the cylindroidal surface formed by the generating line. If the curve be any other than a circle or an ellipse, its projection can only be practically described by finding the projections of a sufficient number of points of the original, from some known property of the curve, or from the mode of its generation; and the required projection must be drawn by hand through the points thus determined. It is obvious that the projection of any plane curve which is parallel to the co-ordinate plane must be equal and similar to the original. But if the original curve be a circle, or an ellipse, the projecting line during its motion will generate a right or oblique cylindrical surface, the section of which by the co-ordinate plane must be either a circle or an ellipse.

49. Whatever may be the oblique position of an original circle with respect to the co-ordinate plane, there must be one diameter which is parallel to that plane; now the projection of this diameter being equal to the original, must be greater than those of all the other diameters of the original circle, which are all necessarily oblique to the plane: and since the projection of every diameter must be a diameter of the projected curve, the projection of this parallel one must be the major axis of the ellipse. This diameter of the original circle parallel to the co-ordinate plane is that which is parallel to the trace of the plane. The conjugate axis of the ellipse will be the projection of that diameter of the original circle which is perpendicular to the former, or to the trace of the plane.

50. The projection of a sphere on a co-ordinate plane must be a circle of the same radius as the sphere, this circle being the projection of that great circle of the solid which is parallel to the co-ordinate plane.

51. In the applications of practical geometry to the arts, the object is either to delineate the forms to which materials are to be reduced, or to guide workmen in making and putting together machinery; or, in the construction of edifices of every description.

52. Owing to the symmetry of the machines or edifices, the forms most commonly required to be delineated are reducible to series of rectangular geometrical solids, the planes of which are either parallel or perpendicular to the horizon. The plans, elevations, sections, profiles, &c., furnished to the workman by the draughtsman, are the projections on rectangular co-ordinate planes, assumed to be parallel to the planes of the machines or edifices, made to a reduced scale; the plan being such a projection, made on a horizontal plane, and the elevation on a vertical plane. When the building or engine is supposed to be laid open, by being cut by a plane, so as to show its interior, the projection made on this supposition is termed a section, or profile.

53. It is obvious, from these assumptions, that the various plane rectilinear, or mixed, figures which are produced by the intersections or boundaries of the various surfaces of the original objects, are represented on the draughtsman's plans, &c. by figures similar to the original forms; and that those plane surfaces of the original object which are vertical to the horizon appear only as right lines on a plan, bounding the figures which are the representatives of original planes parallel to the horizon; and, conversely, these last-mentioned surfaces are represented by lines in the elevations, while the vertical plane figures of the original are projected into similar plane figures on these elevations or profiles.

54. Hence two, at least, and commonly three, such projections, on rectangular co-ordinate planes, are requisite to convey an idea of the forms of an original object; but since these forms of the original are represented of their true dimensions and proportions, such projections are sufficient, and indispensable, as guides to the mechanics who are to construct or put together the edifice or machine.

55. The principles of projection enable us, as far as regards the rectangular parallelopiped, the solid of most frequent occurrence, to combine the two purposes for which such projections are employed; that is, to convey, by one image or figure, an accurate idea of the relative position of the parallel and vertical planes of an original object, reducible to this form, and at the same time to preserve one constant

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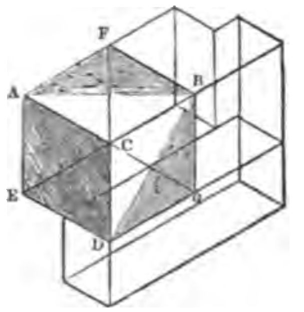
* The sides of the triangle may meet the co-ordinate planes in different dihedral angles; the projections of two of these points, through which the same trace must pass, may therefore lie on contrary sides of YZ. The traces of all planes should be drawn indefinitely extended on each side of this line YZ, or are to be conceived as so extended when circumstances do not admit of their being shown so.

† In the figure, $p'a'$ is shown as the same line as the side of the assumed triangle, to avoid confusion; but this, obviously, need not be the case.

and correct proportion between the magnitudes of the original and of its representative.*

56. It has been shown (26, 27) that the projections of definite right lines, inclined in equal angles to the co-ordinate plane, will be in a constant proportion to the originals; if therefore the three plane right angles forming a solid angle of a rectangular parallelopiped be inclined in equal dihedral angles to the co-ordinate plane, all lines parallel to the three edges of that solid angle will be projected into lines bearing one constant ratio to the originals, and forming with each other equal angles, which are the projections of the right ones formed by the original lines.

57. Thus, for example, if the co-ordinate plane be assumed perpendicular to the diagonal of a cube, the projections of the three edges meeting in either end of that diagonal will form angles of 120° with each other, and the three projections of the edges at one extremity will, respectively, bisect the equal angles formed by those of the edges at the other extremity; while the lines joining the ends of these six equal radii, which lines must obviously form a regular hexagon, will be the projections of the remaining edges of the solid. Each face of the cube is projected into an equilateral rhombus, as ACBF, BCDG, ACDE, BFCG, &c., the sides of which form angles respectively of 120° and of 60° each. If the side of the cube be unity, the equal projections of those sides will be ·8165, which is equal to the cosine of the angle at which the originals are inclined to the co-ordinate plane. The original diagonals of the three faces, AB, BD, DA, are obviously, from the symmetry and position of the solid, parallel to the co-ordinate plane; their projections are therefore equal to those originals, or are each equal to $\sqrt{2}=1\cdot4142\ldots$ If an original solid be made up of rectangular parallelopipeds, having their faces mutually parallel, and the co-ordinate, or plane of projection, be assumed as equally inclined to the three faces forming any of the solid angles, the projections of all its edges, and of all lines parallel to them, would be in the constant ratio to the originals of ·8164 : 1; the dimensions, consequently, of those originals, as measured in the directions of lines which would be isometrically projected, may be set off from any scale along the isometric projections of any lines parallel to the edges of the original solids, and a figure or image of the original constructed which would show the three principal series of planes of which that original was composed.



58. The projections of all circles equally inclined to the co-ordinate plane will be similar ellipses; the axes of these ellipses, when representing circles lying in planes parallel to the faces of a cube equally inclined to the co-ordinate plane, will be to each other in the ratio of the diagonals of the rhombus representing the inscribed or circumscribing square isometrically projected. The following simple method of constructing a scale for determining the lengths of the axes of the isometric projection of a circle will be of service to the practical draughtsman. Construct a right angled triangle the base and perpendicular of which are in the ratio of the side to the diagonal of a square, or as 1 : 1·4142. Set off the length of the isometric projection of the circumscribing square of any original circle along the side of this triangle, from the acute angle, and draw a line parallel to the other side from the point thus marked off; this parallel, and the segment of the hypothenuse cut off by it, will be the minor and major axes of the ellipse. Since the major axis of the elliptic projection of a circle is always equal to the diameter of that circle (49), the major axis of the isometrical projection of a circle is equal to the side of the circumscribing square. Hence the axes of the ellipse and the side of the circumscribing square, when isometrically projected, are as $\sqrt{3}$: $\sqrt{1}$; $\sqrt{2}$.

59. The projecting lines and planes are assumed perpendicular to the rectangular co-ordinate planes, simply to facilitate the construction; but it is obvious that lines and figures may be projected on a plane by parallel projecting lines, making any angle with the plane of projection; such projections are termed *oblique*, but as they are but seldom employed, we shall only here give two general theorems relating to them; since we shall have occasion to recur to this subject in a subsequent part of this article. The oblique projection of a straight line, figure, or curve, lying wholly in a plane parallel to the co-ordinate plane, will be similar and equal to the original; and the oblique projections of parallel right lines will be parallels.

60. The oblique projection of a sphere must be an ellipse, for the parallel projecting lines which are tangential to the spherical surface must always form a right cylinder, the oblique section of which must be an ellipse. The major axis of this ellipse will be the intersection with the co-ordinate plane of one perpendicular to it, and passing through the oblique projecting line of the centre of the sphere. This major axis will consequently pass through the perpendicular, or ordinary projection of the centre of the sphere. The conjugate axis must clearly be equal to the diameter of the sphere.

61. We must now proceed to show how, by a modification of the principles of projection, an image of an object, or a pictorial outline of it, may be obtained, which will convey an idea of the original, just as the outline portrait of an absent person conveys to the spectator an idea of his appearance. It is however only to buildings, engines, machines, &c., consisting of strictly geometrical forms, that this modified projection can be applied; since the constructions by which these projections are obtained are as strictly geometrical as those by which we obtain the projections of such objects on co-ordinate planes.

62. Each point on the surface of an object is seen in the direction of a straight line,* supposed to be drawn from that point to the eye, and representing the reflected ray of light by which that point is rendered visible. The rays from every point of that surface will obviously form a geometrical solid pyramid, the surface of which will be composed of those rays which, touching the object, might be supposed prolonged in the same straight direction beyond it, without penetrating its surface. But when considering the subject of *outline* alone, we need only regard such of the internal rays of the pyramid as proceed from lines on the surface of the object, produced by the intersections of portions of that surface not continuous: and from our limitation of the class of objects, such lines must be either straight, or else geometrical curves; resulting from the mutual intersections of planes and curved surfaces with each other.

63. The general pyramid of rays will therefore be made up of a series of others, having one common vertex, and for their several bases the perimeter of a portion of continuous surface.

64. If we imagine these pyramids of rays cut by a plane, the common section will obviously be an outline of the object as it would present itself to an eye placed at the vertex, each line and point of the section coinciding with the corresponding line and point of the original.

65. As long as the object and the spectator's eye retain the same relative position, it is immaterial in what direction or at what distance the plane cuts the pyramids of rays, for the lines and points produced at each position of the plane must necessarily coincide with the originals when viewed from the vertex; although the outlines on the plane would vary for each of its positions. But each of these different outlines would suggest to the mind the same original combination of forms, provided it be viewed from the true vertex, and cannot be a correct representation or image of the object, if viewed from any other point.†

66. When we revert to the connection between this and

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* This specific application of projection was termed isometric by the late Professor Farish, who pointed out its practical utility, and the facility of its application to the delineation of engines, &c.; as a distinctive one, this term is unexceptionable.

* We need hardly allude to the modification of this assertion rendered necessary by the effects of atmospheric refraction. It is evident that the forms of objects which can be seen by the eye at one time are in no way influenced by these effects, which may therefore be neglected in treating this subject.

† There is a common toy which well illustrates this subject; we allude to a distorted image of a building, which, when viewed from a certain fixed point, presents a natural appearance. This distorted image is a correct section of a pyramid of rays supposed to proceed from the building to the point in question, and therefore when viewed from that true vertex, conveys the same impression that the building itself would do.

ject and drawing, in the common acceptation of the word, we shall point out the precautions that must be taken by the draughtsman, when applying the principles of projection to the pictorial delineation of objects, to prevent his drawing from appearing distorted when viewed indifferently from other than the correct point, which it must inevitably be on most occasions. But at present, dismissing all considerations of light, vision, and art, we shall proceed to treat this branch of the subject of projections, termed perspective, in a purely geometrical manner.

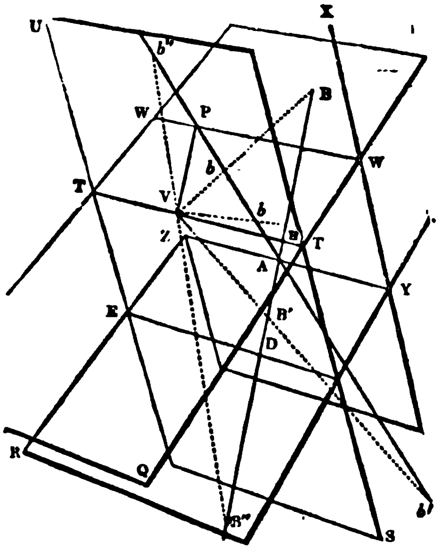
67. Instead of the simple elements alone, which entered into the constructions for determining lines and points, referred to a co-ordinate plane, by parallel lines perpendicular to that plane, we have in perspective projection the additional elements of the convergence of the projecting lines, or rays, intersecting the plane at different angles, depending conjointly on the distance of their point of convergence from the original lines, and from the plane. This variation in the conditions necessitates a different course of proceeding: in the former kind of projection the object of our constructions was to determine magnitudes; in that we are about to consider, our object is to delineate apparent and not real form.

68. The following definitions are here given to avoid unnecessary repetitions. The plane, on which the projection is supposed to be formed, and which is represented by the drawing board or paper on which the constructions are made, will always be termed *the plane of the picture.*

69. The point of convergence of the *rays*, or *projecting lines*, or the vertex of the pyramids of rays, will be designated as *the vertex.*

70. *The centre of the picture* is the point in which a line, through the vertex, perpendicular to the plane of the picture, meets that plane; and the length of this perpendicular, from the vertex to the centre of the picture, is *the distance of the picture or vertex:* this term will also be applied to the line itself when we have occasion to refer to it.

71. The *vertical plane* is one passing through the vertex, parallel to the plane of the picture.



72. Let XYZ . . . and UTES, in the figure, be the plane of the picture and the vertical plane; V in the latter being the vertex. Let BB'' be any straight line taken as an elementary original object: the rays from every point in BB'' will lie in one plane, the intersection, *b' b''*, of which with the plane of the picture will be the indefinite perspective projection or *image* of BB'': the projecting plane (9) passing through any original line BB'' and the vertex will also intersect the vertical plane in a line VD, parallel to *b' b''*. VD is *the director* of the original line.

73. If the original line BB'' were parallel to the plane of the picture, and therefore also to the vertical plane, its indefinite image and director would be parallel to the original line. But if BB'' be not parallel to the plane of the picture and vertical plane, it must intersect them both.

74. The point A, in which any original line cuts the plane of the picture, is termed its *intersecting point;* and D, in which it cuts the vertical plane, is termed the *station point* of that original line.

75. If a line VP be supposed to pass through the vertex, parallel to any original line BB'', it will cut the plane of the picture, if the original line itself be not parallel to that plane. This line VP is termed *the radial* of BB', and the point P, in which this radial cuts the plane of the picture, is *the vanishing point* of the original line.

76. If any original line pass through the vertex, its radial will coincide with it, and the point in which such a line cuts the plane of the picture will not only be its common intersecting and vanishing points, but also the common image of all points in the original line, and consequently of the entire line itself.

77. It follows from these theorems that the original line, its director, its radial, and its image, all lie in its projecting plane, and therefore its image must pass through its intersecting and vanishing points; while its director must pass through its station point: and that these four lines must form a parallelogram, unless the original line be parallel to the plane of the picture; in which case the director and radial will coincide in one line, lying in the vertical plane, parallel both to the original and to its image.

78. Let us now consider the projection or image of any point B in an original line BB'', and the situation of that image in the indefinite one of the line, according to the position of the point B.

If B be at A, the intersecting point of BB'' (74); B and its image *b** will coincide. If B lie in that part of AB which is on the contrary side of the plane of the picture to that on which the vertex is situated, its image *b* will lie between the intersecting and vanishing points, A, P, of the line: and if B be supposed to recede farther and farther from the former, the nearer to the latter will its image approach; so that the vanishing point is the *limit* of the successive images of points, farther and farther distant from the vertex, or it may be considered as the image of an infinitely distant point in the original line.

79. If the point B' be situated between the intersecting and station points of the line, its image *b'* will be on the contrary side of the intersecting point to that on which the vanishing point P is situated; and if B be the station point D of the original line, it can have no image, or its image may be considered at an infinite distance from the vanishing point in either direction.

80. If the point B'' lie on the contrary side of the vertical plane to that on which the plane of the picture is situated, its image *b''* will lie on the contrary side of the vanishing point to that on which the intersecting point is situated; and, as before, the vanishing point may be considered as the limit of the images in this direction; or as the image of a point in the original line at an infinite distance from the station point in either direction.

81. Let two or more original lines be conceived as lying in an original plane YZ, and suppose a plane W, which will be termed *the vanishing plane* of the original one, to pass through the vertex parallel to that original plane. The lines YZ, DE, in which an original plane cuts the plane of the picture and the vertical plane, are called the *intersecting and station lines*, respectively, of that plane; and the lines WP, TVT, in which the vanishing plane cuts the same two planes, are called the *vanishing line* and *parallel of the vertex* to that original plane.

82. The intersecting, station, and varnishing lines, and the parallel of the vertex, are all parallel to each other, these four lines being the mutual intersections of two parallel planes by two other parallel planes.

83. The intersecting and station points (74) of any original lines, lying in one plane, are points in the intersecting and station lines of that plane: and the vanishing points of the same original lines lie in the vanishing line of that plane; for the radials of the originals must lie in the vanishing plane of that in which the original lines lie: and these radials must form with each other, and with the parallel of the vertex, angles respectively equal to those which the original lines form with each other and with the intersecting or station lines.

84. The vanishing line and parallel of the vèrtex to any plane will be those also of all planes whatever which are parallel to the first: and the radial and vanishing point of an original line will be those also of all lines parallel to the first, whether they lie in one plane, or in different ones.

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* We shall continue to employ the same conventional notation as before, designating an original point and line by capital letters, and their images by small, thus a b is the image of A B, and so on.

85. The perspective projections, or images, of any number of original parallel lines, will be either parallel lines, parallel to the originals (73), or will be lines passing through the respective intersecting points of those originals (77), and through their common vanishing point; and the points in which the indefinite images of original lines, not parallel, cut one another, will be those of the points in which the originals cut one another.

86. It has been shown that the image of a line is parallel to that line's director; if therefore two or more lines have a common station point, and, consequently, a common director, or if the station points of two or more lines lie in one director, the images of those lines in either case will be parallel lines; and in these cases only can original lines, not parallel, have parallel images.

87. The ratios which exist between the definitive images and the original segments of lines are easily deducible, either geometrically or analytically; but as these theorems do not lead to rules of frequent practical utility, we forbear, with one or two exceptions, entering into them. Let B″B represent a finite portion of an original line, bisected by the point B′, then the rays VB″, VB′, VB, and the radial VP of B″B, will be harmonical lines; the definite image of the original line will consequently be harmonically divided by the images *b*′, *b*, of B′ and B, and by the vanishing point P. Conversely if any segment of an indefinite image of a line be bisected by a point, the segment of the original line between its station point and the original of the image farthest from that station point will be harmonically divided by the originals of the other two points. If the point which bisects a finite line AB be the station point of that line, the image *a b* of AB will be bisected by the vanishing point P.

88. If an original finite line AB be parallel to the plane of the picture, its image *a b* will be to AB in the ratio of the *distance of the picture* (70) to the perpendicular distance of the plane, parallel to the picture in which AB lies from the vertex; and if AB be divided by a point D in any ratio, the image *a b* will be divided by *d*, that of D in the same ratio.

89. If an original plane figure be parallel to the plane of the picture, the image of that figure will be similar to the original: its periphery will be to that of the original, in the ratio of the *distance of the picture* to the perpendicular distance of the plane of the original figure from the vertex: and the area of the image will be to that of the original, as the squares of these lines. If therefore the distance of the picture be equal to that of the original parallel plane from the vertex, the image of an original figure in that plane will be equal, as well as similar, to the original: this may occur if the original plane coincide with that of the picture, or if the vertex be at equal distances from both, and lie between them; or if the vertex be infinitely and therefore equally distant from both on the same side.[*]

90. If an original plane, or planes, be parallel to the plane of the picture, their vanishing plane will coincide with the vertical plane: no such planes can therefore have any vanishing line.

91. If an original plane, or planes, be perpendicular to the plane of the picture, their vanishing plane will pass through the distance of the picture (70); consequently the vanishing line of such plane, or planes, will pass through the centre of the picture.

92. If an original plane pass through the vertex, its vanishing plane will coincide with it; the intersecting and vanishing lines will therefore coincide in one, as will also the station lines, and parallel of the vertex; and the images of all lines and plane figures, in such an original plane, will coincide in one line, that in which the plane itself cuts the plane of the picture.

93. The vanishing planes of two original planes will form the same dihedral angle that the original planes form with each other, and the line in which the vanishing planes intersect will pass through the vertex and be parallel to that in which the original planes intersect each other; it will, therefore, be the radial of this latter-named intersection. The intersection of the two vanishing planes, or this radial, will cut the plane of the picture in the vanishing point of the intersections of the original planes, which vanishing point will obviously be the intersection of the two vanishing lines determined by the two vanishing planes.

94. It follows, therefore, that the line in which two original planes cut one another will have for its vanishing point that in which the two vanishing lines of the original planes cut each other, and that the intersecting point of the common intersection of two original planes will be that in which the intersecting lines of those planes cut each other.

95. Every vanishing plane is supposed to have an *auxiliary* one, perpendicular both to it and to the plane of the picture, and therefore passing through the distance of the picture this auxiliary vanishing plane will cut the plane of the picture in an *auxiliary vanishing line* perpendicular to the principal one, and passing through *its centre*, and also perpendicular to the intersecting lines of the original planes. The line in which the auxiliary vanishing plane cuts the principal vanishing plane is termed the *principal radial* of the original plane, or planes, to which the vanishing plane pertains. This principal radial is obviously perpendicular to the principal vanishing line, and meets it in its centre, which will consequently be the vanishing point of all lines in the original planes perpendicular to their intersecting lines.

96. The principal radial will form, with the distance of the picture and with the auxiliary vanishing line, angles equal respectively to the complement of the angle, and to the angle itself, which the original planes make with the plane of the picture.

97. The *auxiliary radial* of any vanishing plane is one lying in the auxiliary vanishing plane, and perpendicular to the principal radial; this auxiliary radial is that of all lines perpendicular to the original planes, the common vanishing point of which is the point in which the auxiliary radial meets the auxiliary vanishing line. This auxiliary vanishing point is the image, or projection of the points in which the auxiliary radial intersects all the original planes to which the principal vanishing plane is common.

98. The auxiliary vanishing plane, being perpendicular to the original planes, as well as to their vanishing plane, and to the plane of the picture, will intersect those original planes in lines perpendicular to their intersecting lines, and parallel to their principal radial.

99. It follows from these definitions, that the vanishing lines of all planes perpendicular to one or more parallel original planes will pass through the auxiliary vanishing point of those planes.

100. If the original plane, or parallel planes, be perpendicular to the plane of the picture, their principal radial will coincide with the distance of the picture. Their auxiliary radial will be parallel to the plane of the picture; and the vanishing lines of all planes, perpendicular to the original planes, will be parallel to each other, and perpendicular to the vanishing line of the original planes.

101. If a circle be supposed, described in an original plane on the point, as a centre, in which the auxiliary radial cuts that plane, all lines touching that circle will be intersections with that original plane, of vanishing planes of other original planes, inclined to the first in a certain angle. The point in which any one of these tangents to the circle cuts the intersecting line of the first original plane, will therefore be a point in the vanishing line, to be determined for each such vanishing plane respectively, while the vanishing point of each such intersection in the original plane will be a second point in the vanishing line of the plane inclined to the former. Therefore this vanishing line will be determined, if these two points be found.

102. For if a right conical surface be imagined formed round the auxiliary radial as an axis, having the vertex for its apex, and its side forming with that axis the complement to the angle the secondary original planes form with the first; the vanishing planes of these secondary original planes will touch that conical surface in a line, which will be the principal radial of each such vanishing plane; and therefore each vanishing plane will cut the first original plane in a line tangential to the circular section of the conical surface by that original plane. Again, the point in which these tangents to the circular section cut the intersecting line of the first original plane, will be common to the intersections with the plane of the picture of each vanishing plane respectively, or to the vanishing line as above stated.

103. Constructions can be made, founded on these gen

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[*] From this theorem the relation between perspective projection, and projection on a co-ordinate plane by parallel lines, either perpendicular or oblique to that plane, will be at once perceived; the latter being the *limit* of the perspective image, as the vertex of the converging rays may be supposed to become more and more distant from the original; or the former may be considered as a perspective projection, the vertex being at an infinite distance.

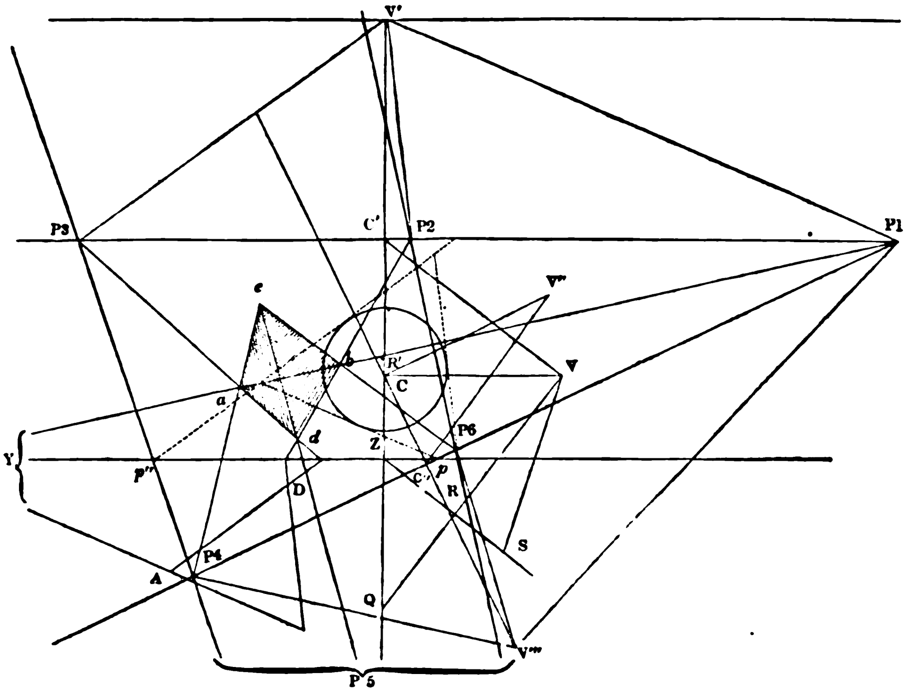
ral theorems, by which the perspective projection of plane figures, or solids, may be obtained on a plane, taken to represent the plane of the picture, and all other original or vanishing planes brought to coincide with it by being turned round on their intersections with each other, and with the assumed plane of the picture.

104. If an original plane be supposed turned round on its intersecting line till it coincide with the plane of the picture, the relations of lines in the plane to each other, and to the intersecting line, will not be affected by so doing. And if the vanishing plane of that original plane be also turned round on the vanishing line in the *same* direction, the same observation will apply to the radials of original lines in the original plane, which will preserve their original relative position to that vanishing line: these radials will be therefore parallel to the original lines respectively, when both they and the original lines are brought into the same plane.

105. Since the principal radial is perpendicular to the vanishing line, this radial will coincide with the auxiliary vanishing line when the vanishing plane is brought into the plane of the picture.

106. But if, as frequently occurs, the constructions must be made on the supposition that the original plane has been turned round on its intersecting line in one direction, and the corresponding vanishing plane turned round on its vanishing line in the contrary direction; the radials will not be parallel to the original lines on this supposition, when the two planes coincide in one. These radials must therefore be drawn, making the same angles with the parallel of the vertex and with the auxiliary vanishing line, that the original lines make with the intersecting line, and with lines perpendicular to it.

107. As an example of the application of the foregoing principles, let it be required to draw the perspective projection of a tetrahedron, of a given magnitude, its position with respect to the vertex and the plane of the picture being also given or assumed.



108. Draw YZ* at pleasure, to represent the intersecting line of one plane of the solid; and take any point C for the centre of the picture. Through C draw CV′ perpendicular to YZ for the auxiliary vanishing line of the plane (95). Also draw CV parallel to YZ, and equal to the given distance of the picture (70); this, and the following steps in the construction, being founded on the supposition of the auxiliary vanishing plane (95) being turned round on CV′, till it coincide with the plane of the picture. Make the angle CVC′ equal to the complement of that at which the plane of the tetrahedron is assumed to be inclined to the plane of the picture (96), VC′ will be the principal radial of the plane, and C′ the centre of its vanishing line; consequently a line P_3P_1, drawn through C′, parallel to YZ ([illegible]2), will be that vanishing line. Draw VQ, perpendicular to VC′, for the auxiliary radial, cutting VC′ the auxiliary vanishing line, in Q the auxiliary vanishing point of the plane of the original tetrahedron.

109. Draw ZR parallel to VC′ for the intersection of the auxiliary vanishing plane with the original one; R therefore, in which ZR meets VQ, will represent the point in which the auxiliary radial meets the original plane.

110. Make C′V′ in that line equal to C′V, and through V′ draw a parallel to YZ, which will represent the vertex and its parallel (81) brought into the plane of the picture by the turning of the vanishing plane on the vanishing line P_3P_1.

111. Draw the equilateral triangle ABD for the face of the tetrahedron in its given or assumed position with respect to the intersecting line of its plane and the centre of the picture: this construction implies that the original plane of that face has been turned round on YZ, in the same direction the vanishing plane was turned round in, on P_3P_1. Through V′ draw the radials of the sides of the triangle parallel to them, and cutting the vanishing line in P_1, P_2, P_3, the vanishing points of those sides; the perspective images of which being drawn through the intersecting and vanishing points of the sides respectively, will form the image *abd* of the given face.

112. If the original triangle had been assumed as lying between the intersecting and station lines of its plane, ABC would have been above the former line, and its image *abd* below it; if that plane be supposed turned round in the same direction.

If rays be drawn from V′ through A, B, and D, they will be found to pass through the images *a*, *b*, *d* of those points, and recourse must frequently be had to this mode of determining the image of a point in a line, when circumstances prevent the possibility of determining it by means of the image of another line, also passing through the original point. Or if the distances of any points in a line, as A, B, from its intersecting point, be set off from that point along the intersecting line, and the radial of the line be laid off along the vanishing line, from the vanishing point, of the original line; then lines drawn from the former points in the intersecting line to the point in the vanishing line, will cut the image of the original line in those of the points A, D.*

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* In this and some subsequent figures, the bracket with a letter to it is intended to signify that that letter applies to the point of convergence of the lines so indicated: as for example in this figure, P_5 refers to the point in which P_3 P_4, and P_3 P_6 would meet. It must be observed also, that reference is in some places made to lines or points, not shown in the figures, to prevent confusion.

* Let Y be the intersecting point of an original line YA, and P its vanish-

113. By one or other of these principles, the images of any definite right lines, and therefore of any rectilinear figure, may be obtained. For one or more original lines may be always assumed as passing through one or more points the images of which are required; so that the indefinite images of the assumed lines will give those of the points sought, by its intersections with the images of other lines, in which those points lie: and these assumed lines may be so taken as to define the images with more precision, or to obviate the necessity of drawing radials of lines but little inclined to the intersecting lines of the planes in which they lie. ZR is the perpendicular distance of the point in which the auxiliary radial cuts the original plane from its intersecting line; R therefore is the centre of the circular section of the conical surface before alluded to (102). Make ZR' in ZV' equal to ZR: draw VS to make at V, with VR, the complement of the angle at which the faces of the tetrahedron are inclined to each other. From R', as a centre, with RS for a radius, describe a circle. Draw lines to touch this circle, parallel respectively to AB, BD, AD. Through the point *p*, in which the tangent parallel to AB cuts YZ, and through P_1, the vanishing point of AB, draw $P_1 P_4$, the vanishing line of the face of the solid meeting the face ABD in AB: and on the same principles $P_3 P_6$, $P_3 P_4$, the vanishing lines of the two remaining faces are found; then $P_4 P_5$, P_6, in which these vanishing lines intersect each other, will be the vanishing points (94) of the edges of the solid, and lines accordingly drawn from *a, b, d* to these points will complete the image of the tetrahedron.

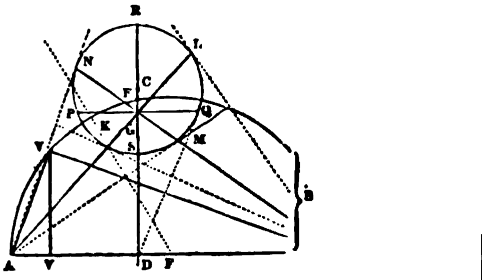
114. Simple as is the construction above described, for finding the vanishing lines of planes making any proposed angle with a given plane, it may frequently be avoided by availing ourselves properly of the symmetry of the solid to be delineated. Thus, in the example before us, after finding the image, *a, b, d*, of one face of the tetrahedron, we might have determined the image of the centre of that face by drawing those of the perpendiculars on each side of the triangle from the opposite angles; a line drawn through this centre and through Q would be the image of one, perpendicular to the plane of the triangle (97): this line would pass through the vertex of the pyramid, or through the angular point in which the other three faces meet, by finding the image of this point, which can be easily done by first determining the intersecting point of the perpendicular, and the intersecting line of any plane in which it lies; then lines drawn from *a, b,* and *d* to this image *e* would complete the figure.

115. When a vanishing line is obtained, it is frequently requisite to determine its centre and distance, or its principal radial; this is done by the construction employed to determine the vanishing line $P_1 P_3$. Thus, to determine the centre, &c. of vanishing line $P_1 P_4$, draw a parallel to it through C, making CV'' equal CV, the distance of the picture; also draw CV''' perpendicular to the vanishing line for its auxiliary one, cutting the former in C'' its centre. Make $C''V'''$ equal $C''V''$, the principal radial; then $V'''P_1$, $V'''P_6$, $V'''P_4$ being drawn, they will be the radials of the three sides, *a b, e b, e a,* of the face of the solid, and will be found, accordingly, to make angles of 60° with each other (83). The radial $V'''P_1$ will also be found equal to $V'P_1$, these lines representing one and the same line, only brought into the plane of the picture by the rotation of two different vanishing planes on their vanishing lines.

116. The perspective projection of a curve may always be found by means of the images of a sufficient number of points in the original, or by the projection of some inscribed or circumscribed polygon; if the curve be a plane one: in this case the image of a tangent to the original curve will be a tangent to the image of that curve. For if the image of the tangent meet that of the curve in more than one point, these points must be the images of points in the original curve through which the original of the tangent must pass; which is contrary to the supposition. But there are some theorems regarding the perspective projection of a circle, and constructions founded on them, which ought to be well understood by the draughtsman.

117. The rays from the circumference of a circle, obviously, form a conical surface, the section of which, by the plane of the picture, will be one of the conic sections. If the original circle, or base of the cone of rays, be parallel to the plane of the picture, the image will be a circle, the radius of which will be to that of the original in the ratio of the distance of the picture (70) to the distance of the plane of the original circle from the vertex (89).

118. If an original circle do not touch, or cut, the station line of its plane, its image will be an *ellipse* wherever the plane of the picture may be; unless the section by the plane of the picture happen to be a subcontrary one, an exception to which we shall recur on a subsequent occasion. If the station line be a tangent to the circle, its image will be a *parabola;* and if that line cut the circle, the image will be the opposite branches of an *hyperbola,* lying on contrary sides of the vanishing line of the original plane (80).



119. Let KNLM be an original circle, AB being the station line (81); the image of the circle will, in this instance, be an ellipse. Draw the diameter CD to the circle, perpendicular to AB; and let G be the point in CD through which the cords of the tangents from all points in AB pass, according to the well known property of the circle. Let V represent the vertex, the vertical plane being supposed to be turned round on the station line AB, till it coincide with the plane of the circle; VV' being the director perpendicular to the station line. Make DE, in DR, equal to the tangent to the circle drawn from D; bisect VE by a perpendicular, cutting AB in F; on F as a centre, with FV or FE for a radius, intersect AB in A and B, and draw lines through these points and through G; KL, MN will be the originals of the axis of the elliptic image of the given circle, wherever the plane of the picture may be assumed, and at whatever angle that plane and the vertical one be inclined to the plane of the circle.

120. If A, B be two points in AB, such that each is in the chord of the tangents from the other point produced, then from the properties of the circle, AE, BE will be equal respectively to the tangents AN, BL, drawn from those points: and the square on AB is equal to the sum of the squares on AN, BL, or on AE, BE. E therefore lies in the circumference of a circle described on AB as a diameter. Since the angle AVB, made by the directors of AL, BN, is a right angle by construction; the images of AL, BN will be perpendicular to each other, and parallel, respectively, to those of the tangents AN, AM; BL, BK having the same station points with the chords KL, MN. Again, since AL is harmonically divided in K and G, and BN in M and G, the image of KL will be bisected by that of G, and the image of MN will be also bisected by the image of G (87): hence those images being diameters to the ellipse, mutually bisecting each other, and parallel reciprocally to the tangents which are the images (86) of AN, AM, BK, BL, the images of KL, MN must be conjugate diameters, and since those diameters are perpendicular to each other, they must be the axes.

121. If V', the foot of the director VV', coincided with D, or if VV' were in the auxiliary vanishing plane, the perpendicular to VE would be parallel to AB, and PQ, SR would be the originals of the axes, which accordingly would be

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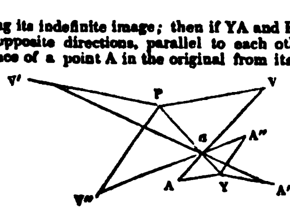
ing point, YP being its indefinite image; then if YA and PV be drawn in any, whatsoever, but opposite directions, parallel to each other, YA being made equal to the distance of a point A in the original from its intersecting point,



and PV equal to the length of the radial of the line; then A, V being joined, AV will cut YP in *a*, the image of the point A. For however the lines YA, PV may be drawn, the triangles YA*a*, *a*VP will be similar; the antecedents YA, PV being constant, the consequents Y*a*, *a*P must be so likewise. When this principle is applied, the two parallels may be so taken that the line VA joining their extremities may cut YP at nearly right angles, and so define the point with precision parallel and perpendicular to the intersecting line. But in every other position of VV′, with reference to the circle, these axes must be oblique to that intersecting line, while the angles they form with it will vary according to the distance of V′ from D, and according to the length of the director VV′.

122. The points G and E will not be common to two or more concentric circles, the originals of the axes of the elliptic projections of concentric circles will not be in the same straight lines, nor will they have the same station points, except in the case of V′ and D coinciding, when the originals of the axes will be parallel and perpendicular to AB.

123. If AB touched or cut the original circle, the originals of the axes, &c., of the parabolic or hyperbolic projections might be found on the same principles: but as these curves do not often occur in practical perspective drawing, we shall not dwell on the subject.

124. The only solids with curved surfaces that need be considered are, the cylinder, the cone, and the sphere.

125. If a line be conceived to pass through the vertex, parallel to the axis of a cylinder, whether right or oblique, two planes passing through this parallel will touch the cylinder in two lines of its surface, also parallel to its axis, which will be the originals of the straight outline of the perspective projection, or image, of that cylinder.

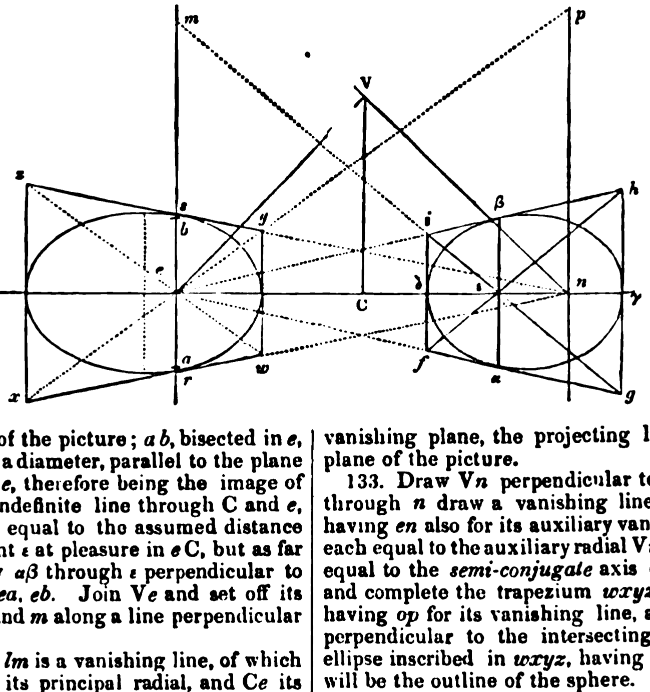
126. These two tangential planes will cut the plane of the base of the solid, or that of any section of it whatsoever, in two lines, which will be tangents to the curve of that section. And the parallel to tne axis through the vertex is obviously the radial of that axis, which, by its intersection with the plane of the picture, will determine the vanishing point of that axis; and this vanishing point, it must be remembered, is the image of the point, in any original plane, cutting the cylinder in which the two tangents to the curve of the section in that plane meet, which have been shown to be the originals of the outline of the solid.

127. If therefore the image of the base or of any section of the cylinder by a plane be obtained, lines drawn tangents to this image through the vanishing point of the axis will give the straight parts of the outline of the solid; these outlines must also be tangents to every other curve which is the image of any section of the original cylinder.

128. If a line pass through the vertex and the apex of a cone, and meet the plane of its base, or any other plane cutting the cone, two lines drawn through the point of intersection tangents to the curve of the section will be the intersections with that plane of two others passing through the vertex and tangential to the surface of the solid, and these two planes will touch the cone in lines which will be the originals of the outline of its image.

129. The ray just mentioned passing through the apex of a cone is analogous to the radial of a cylinder passing through the vertex, the cylinder being considered as a cone, with its apex infinitely distant.

130. If the line through the vertex and the apex of a cone, or the ray of that apex, be parallel to the plane of its base, or of any section, the tangents to the base lying in its plane, or in that of such section, must be drawn parallel to that ray, and the image of the apex will be the vanishing point of these parallel tangents.



131. Let C be the centre of the picture; ab, bisected in e, being given as the image of a diameter, parallel to the plane of the picture, of a sphere[*] e, therefore being the image of its centre (88). Draw an indefinite line through C and e, and CV perpendicular to it, equal to the assumed distance of the picture; take any point ϵ at pleasure in eC, but as far from e as convenient; draw $\alpha\beta$ through ϵ perpendicular to Ce, making $\epsilon\alpha$, $\epsilon\beta$, equal to ea, eb. Join Ve and set off its length each way from e to l and m along a line perpendicular to Ce.

132. By this construction lm is a vanishing line, of which e is the centre, Ve equal to its principal radial, and Ce its auxiliary vanishing line (95); l and m will obviously be the vanishing points of the diagonals of every square, lying in original planes having lm for their vanishing line, the sides of that square being parallel and perpendicular to the intersecting line of its plane; accordingly the quadrilateral $fghi$ is the image of such a square, lying in such a plane, and the line $\alpha\beta$ being made equal to the given image of a diameter of the sphere, $\alpha\beta$ and ab are the images of equal original lines parallel to the picture and equally distant from it, or both lying in a plane parallel to that of the picture. If therefore an ellipse be described in $fghi$, touching the sides in the points $\alpha\beta\gamma\delta$, and having its transverse axis in Ce, this ellipse will be the image of an original circle equal to a great one of the sphere, and having its plane parallel to that passing through the vertex and the centre of the sphere, or this original circle may be regarded as the oblique plan, on a plane parallel to it, of the section of the sphere by the vanishing plane, the projecting lines being parallel to the plane of the picture.

133. Draw Vn perpendicular to Ve, cutting eC in n, and through n draw a vanishing line perpendicular to en, or having en also for its auxiliary vanishing line; make no, np, each equal to the auxiliary radial Vn; make er, es,[*] in lm, each equal to the *semi-conjugate* axis of the ellipse last drawn, and complete the trapezium $wxyz$ as the image of a square having op for its vanishing line, and its sides parallel and perpendicular to the intersecting line of its plane. An ellipse inscribed in $wxyz$, having its transverse axis in en, will be the outline of the sphere.

134. For n being the auxiliary vanishing point of the plane of the original of $fghi$, op is the vanishing line of all planes perpendicular to that original plane, and intersecting it in lines parallel to the plane of the picture. The original square of the quadrilateral $wxyz$ is therefore perpendicular to the plane of the original of $fghi$, or to the vanishing plane passing through the vertex and centre of the sphere. Now it will be seen that the conjugate axis of the ellipse in $fghi$ is the *oblique plan* (59) of the chord of the tangents from the vertex to the section of the sphere by the vanishing plane, which chord of the tangents must be a diameter of the small circle of the solid, constituting the original of its apparent outline; this small circle being the base of the cone of rays tangential to its surface (62), and having its plane perpendicular to that of the vanishing plane passing through the vertex and centre of the sphere; $wxyz$ is consequently the image of the square circumscribing the circular base, and the inscribed ellipse that of the circle itself, or this ellipse is the outline of the sphere.

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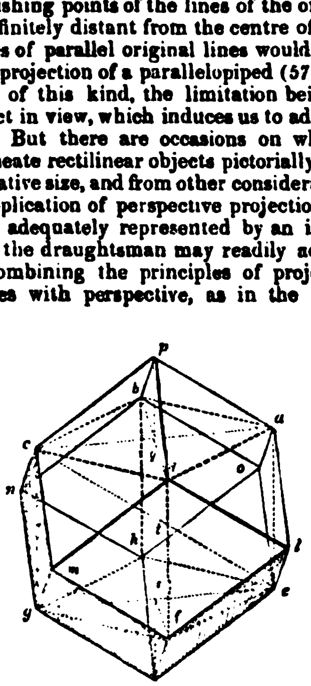
[*] ab need not be perpendicular to the line ce; it is shown so in the figure, to avoid unnecessary lines; but as every diameter of the sphere which lies in a plane parallel to that of the picture is also parallel to that plane, ab may make any angle whatever with Ce.

[*] The points ra, sb, are not the same, though they cannot be distinguished in the figure

135. If the distance of the vertex (70) be supposed to be indefinitely great, compared to the magnitude of the object to be represented, the pyramid of rays may be conceived to become a prism, or the rays to be parallel. On this supposition the vanishing points of the lines of the original object would be indefinitely distant from the centre of the picture, and the images of parallel original lines would be parallels. The isometric projection of a parallelopiped (57) is obviously a limited case of this kind, the limitation being necessary from the object in view, which induces us to adopt that kind of projection. But there are occasions on which it is desirable to delineate rectilinear objects pictorially, which from their small relative size, and from other considerations, do not require the application of perspective projection, and which would not be adequately represented by an isometric one. In such cases the draughtsman may readily accomplish his purpose by combining the principles of projection on coordinate planes with perspective, as in the following example.



136. Let a hexagonal figure, *abcdefg*, be drawn, with the condition that each pair of opposite sides shall be parallel, and consequently equal; from the angles *a,c,f* draw lines parallel to the alternate sides, and meeting in a point *d*, and from the intermediate angles *b,e,g* draw lines parallel to the remaining sides respectively, and meeting in *h*. The figure thus formed will be the *orthographic* or *orthogonal* projection of a cube, under certain unknown conditions of inclination of the plane of projection to the projecting lines, and of these to the original planes of the solid.

137. The projections of the centres of each face of the cube, as *q*, may be found by drawing the diagonals, as *ac*, *bd*, and if lines be drawn through the centres of each pair of opposite faces, as *pr*, which lines will obviously be parallel to the edges of the solid, and perpendicular to the planes of the faces, they will pass through the vertices of right pyramids placed on each face. By making the altitude of these pyramids, as *pq*, equal to half the projection of the parallel edges *bf*, &c. of the solid, we obtain the remaining angles *l, m, n, o, p, r*, of the solid termed a rhomboidal dodecahedron, one diagonal of each face of which is one edge of the original cube.

138. By previously constructing the projection of a cube in the manner just described, the sides of which will furnish a scale of the ratio of the projections of any lines parallel to the edges of that cube, the projection of any parallelopiped may be obtained, and from this again the image of any symmetrical solid deduced. In this manner the forms of crystals can be drawn with the most perfect accuracy, and a most distinct conception obtained of them and of the relative position of their planes. And by analogous constructions diagrams of the theorems of solid geometry may be drawn, which would greatly facilitate the study of analytical geometry.

139. It has been stated that perspective projection is principally employed to furnish a pictorial outline of a building, machine, &c., or to convey an idea of an object of that description to the spectator, but to do this the perspective outline must excite in his mind the ideas of the real forms of that object in their relative situations, such as would be excited by the object itself, when viewed from a given point. But there are limitations to the apparent forms of objects, arising from the structure of the eye and the laws of vision, which the draughtsman must never lose sight of, when he practically applies the purely geometrical principles we have deduced, or otherwise he may produce an accurate projection of an object which would be perfectly unintelligible to an ordinary spectator; as the outline of the sphere, deduced in the preceding example, would be to an uninitiated eye.

140. Since the eye can only embrace at one time a very limited field of view, in order to see the whole of an object without changing the place of the eye, the spectator must not be nearer to it than a certain distance, for otherwise he would have to turn his head to see the successive parts, and at each such change of position the apparent forms of those parts just escaping from his view would undergo a considerable modification, arising from the structure of the eye itself. Few persons are aware of these modifications, owing to the effects of habit and the result of the judgment, which induce us unconsciously to assign the real and constant forms we know the parts of the object to possess to the apparent forms under which those parts are seen. Indeed it requires a considerable degree of abstraction and education of the eye to make the mind cognisant of the fact, that it is never the real form of an object that presents itself, a truth familiar to artists, who know that persons when first attempting to draw an object before them by eye, invariably draw it as they know it to be, and not as they really see it.

141. We have stated that the perspective projection of an object is rarely viewed from the precise point from which alone it ought to be viewed, so that the forms in the projection may suggest the ideas of the original forms whence they were deduced; consequently the outline should not in any part deviate greatly from what we may call the average form under which the true one would present itself to the eye. To effect this accordance the draughtsman must assume his point of view, or *vertex*, at such a proportional distance from the object itself, or from the imaginary model of it, that the rays from the points of it farthest apart, may not contain an angle greater than 60° at most, and, if circumstances allow of it, of not more than 45°. In short the pyramid of rays from an object to the vertex should be included within a cone the angle at the apex of which is not greater than that above named.

142. The distance of the vertex from the object being determined from these considerations, and its position with respect to the various parts of the original object decided by the conditions of the kind of view of that object it is proposed to delineate, the position of the plane of the picture should, generally speaking, be perpendicular to the axis of the cone or pyramid of rays before alluded to; but the following principles must determine more accurately its situation.

143. From the frequency of their occurrence under circumstances favourable for the observation, the eye is accustomed to the apparent convergence of long horizontal parallel lines, as in streets, aisles of cathedrals, long avenues of trees, or walls, &c., but perpendicular parallel lines are rarely if ever long enough to cause this optical effect. Now we have proved that the projections of parallel lines never can be parallel unless the originals are parallel to the plane of the picture; if therefore the draughtsman were to assume that plane *not* parallel to the vertical lines of a building, the convergence of the projections of these lines would strike the eye of a person looking at his drawing, as being at variance not only with his judgment of the real parallelism of the lines in question, but even with his daily uncultured observation. But there is another optical phenomenon regarding the appearance of long parallel lines, which we must briefly allude to, because it throws considerable light on the distinction between the apparent forms of objects seen by the eye, which forms are functions of the angles solely under which the original forms are seen, and the figures on a plane, resulting from the section by that plane of the pyramids of rays from those original forms, which sectional forms are functions of the arcs subtending those angles.

144. If a spectator stand opposite two or more long horizontal parallel lines, as those of the façade of a long building or of a garden wall, for example, he very palpably perceives the apparent convergence of these parallels in both directions, as they recede from him to the right and left: on reflection, he is therefore convinced that the apparent forms of the really parallel straight lines are curves, produced by the varying angles under which the equal ordinates between the parallels are seen, as they become more and more distant from the eye.

145. The parallel projections of such long horizontal lines which would result from the plane of the picture being

assumed parallel to the originals, would reassume their natural apparent curvature, if viewed from the correct vertex; but if not, their parallelism would offend the eye as being at variance with daily experience, and still more would any attempt to draw on a plane the apparent curvature of the lines in question be reprehended as being contrary to the verdict of the judgment, which decides that the originals, being straight lines, ought not to be represented by curves.

146. The draughtsman consequently must never assume his plane of the picture parallel to the longest side of a building, &c., however much he may be tempted to do so from the facility of making his constructions under this condition, when the projections of such a side would subtend at the vertex an angle of more than 15° or 20°.

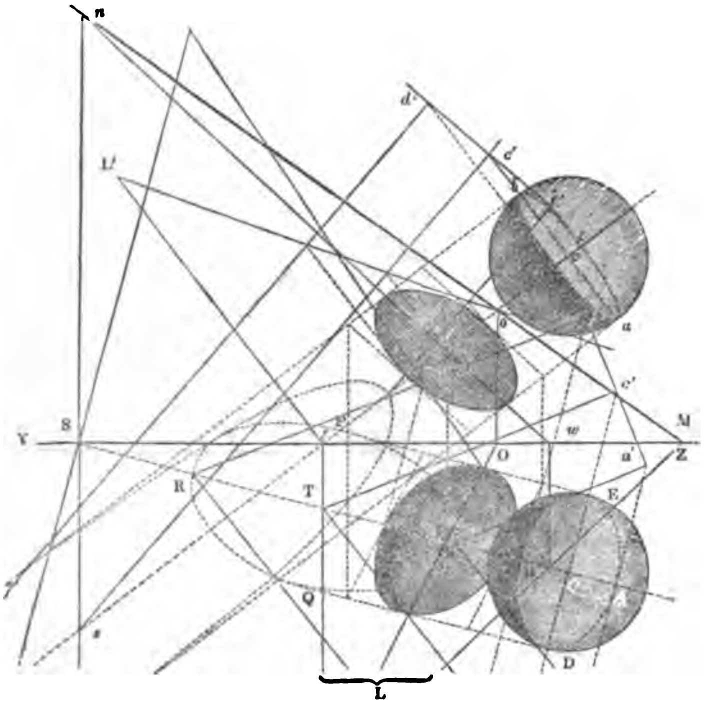
147. Keeping these conditions in view, the draughtsman may assume the distance of his picture, or its distance from the vertex, entirely according to his own convenience, since it is only the absolute magnitude of the image or projection which is altered by the different distances of the picture, the figure of the image being similar on all parallel planes, as long as the vertex and object remain the same. For the sake of facility of construction, he will generally assume his plane of the picture as coinciding with some principal vertical line of the object or model.

148. The *shadow* of any object is obviously the *projection* of it on a surface, by converging or parallel lines or rays, according as the luminary is supposed to be at a finite or at an infinite distance, as the sun may be considered to be as regards terrestrial objects. When therefore we have obtained the projection of an object by the principles just explained, they will also enable us to obtain the projection of its shadow on one or more planes or surfaces, as supposed to be cast by an artificial light or by the sun; the problem being simply to determine the projection of the intersection of a pyramid or prism of rays passing from a given or assumed point through the points of a projected object.

149. If the object be *perspectively* projected and the luminary be the sun, the vanishing point of the parallel rays, whose direction must be given or assumed, will represent the sun, since that vanishing point is the image of a point infinitely distant.

150. Although our power of forming correct conceptions of the true form of an object, as derived from a projection or pictorial representation of it, is much increased by the addition of light and shade, and of shadows of the object correctly projected by rules identical with those by which its outline was obtained, yet as soon as we thus approach the domain of a higher art, that of painting, the mathematical precision of the shadows we should obtain by our rules must yield to more important considerations connected with the arts alluded to. Hence it is that the draughtsman seldom applies the geometrical principles for finding the true shadows of the engine, building, or analogous object, the outline of which he has delineated, for at an early stage of his practice in drawing he ought to have acquired sufficient knowledge of art to be able to add to his outline the effect of light and shade without any gross violation of truth of nature, and with a better pictorial effect than he could ensure by geometrical rules. We shall consequently only give two simple examples relating to the projection of shadows, rather as affording additional illustrations of the principles of projections, than for any practical utility as regards the specific subject of shadows.

151. Let the line CS, *cs*, passing through the centre C, *c*, of a sphere, be given as the direction of the solar rays; it is proposed to determine the shadow of that sphere on the given plane LM*n*. It is obvious that the problem is to determine the section of the right cylindrical surface, formed by the system of parallel rays, which are tangential to the spherical surface, by the plane LM*n*; and that the great circle of the sphere passing through the points in which these rays touch it will be the base of the cylinder, and the boundary between the illuminated hemisphere and that in shadow.



152. Draw *cc′*, C*c′*, perpendicular to the projections of the ray, and make them respectively equal to the distances of the centre of the sphere from the co-ordinate planes; C′*s*, *c′*T, drawn through the points in which the given ray cuts the co-ordinate planes, will represent that ray brought into the co-ordinate planes by the turning round of its projecting planes on its projections; draw *a′b′*, *d′e′*, perpendicular to *c′*T, *c′s*, making them equal to the diameter of the sphere; then lines drawn through *a′*, *b′*, parallel to *c′*T, will represent the two rays, touching the surface of the solid and lying in the projecting plane of the given ray brought into the co-ordinate plane along with that ray: these lines will cut CT in QR, the vertices of the major axis of the elliptic outline of the shadow of the sphere on the co-ordinate plane. The conjugate axis QP will be given by drawing lines parallel to CT tangents to the projection of the sphere: for these last parallel tangents will be the boundaries of the projections of the cylinder of rays. Lines drawn through *a′*, *b′*, parallel to C*c′*, will cut *c*T in the vertices A, B, of the conjugate axis of the elliptic projection of the great circle, separating the illuminated hemisphere from that in shade; a diameter DE to the circular projection of the sphere, drawn through *c* perpendicular to CT, will be the major axis of this ellipse.

153. For the plane of the great circle, of which ADBE is the projection, is obviously by the construction perpendicular to the given ray, and the plane of this circle is cut by the projecting plane of the given ray CT in the original of AB,

while the diameter DE is the projection of the intersection with the plane of the same great circle, by a plane passing through the given ray CS, *cs*, and perpendicular to the plan-projecting plane (9) of the given ray. This perpendicular plane must therefore be the elevation-projecting plane of the given ray.

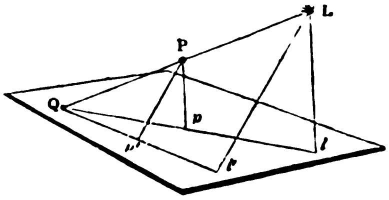
154. By the same construction applied to the other projection, the elliptic elevation *adbe*, of the circle separating the light and shade on the sphere, and the elliptic shadow of the sphere on the vertical co-ordinate plane, may be obtained.

155. It is clear that in this example the two elliptic outlines of the shadows of the sphere on the co-ordinate planes, must cut YZ in two common points; because the segments of the ellipse on either side of YZ of each outline is the projection on the one co-ordinate plane of that portion of the cylinder of rays which forms on the other co-ordinate plane the portion of the outline of the shadow on the same side of YZ. *t*L, perpendicular to YZ, is the trace of the elevation projecting plane of CS, *cs*; *o*, O, is the point in which this same plane cuts the trace of the given plane, consequently LO is the plan of the intersection of those two planes, and T, in which this line is cut by the plan of the ray CS is the intersection of that ray, and the given plane; the elevation *t′* of the same intersection may be obtained by applying the same constructions to the other traces and projections.

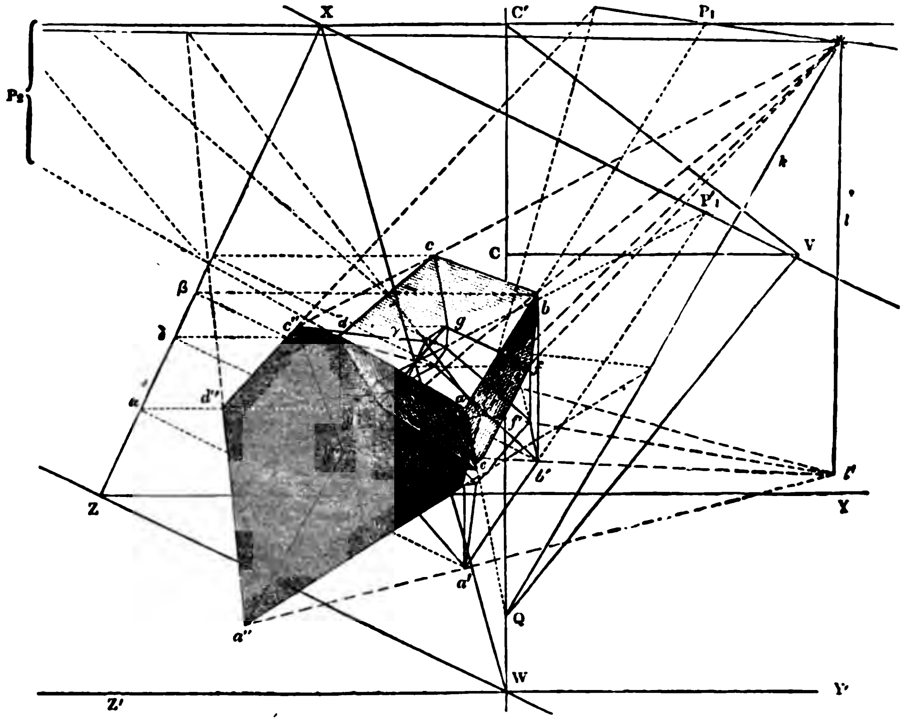
156. The two pair of parallel planes, which are respectively perpendicular to the co-ordinate planes, and therefore to each other, and which are parallel to the given ray, touch the sphere in the points A, *a*; B, *b*; D, *d*; E, *e*. These four planes will be cut by the plane LM*n* in a parallelogram, the sides of the projections of which must be parallel to those of the ray CS, *c*, *s*, and to the lines LO, *wn*. Draw *t*L′ perpendicular to *ot*, and make *t*L′ equal to *t*L; join *o*L′, which will represent the intersection of the projecting plane with LM*n*; draw lines through *d′*, *e′*, parallel to *c′s*, and from the points in which these parallels cut *o*L′ draw parallels to L′*t* to cut *ot*; again lines drawn through these last intersections parallel to *wn* will be the two sides of the elevation of the rectangle above mentioned; the parallel tangents at *a* and *b* will complete the figure; and *ot*, *wn*, will cut the opposite sides in the points in which the elliptic outline of the shadow of the sphere will touch those sides, or the points which represent the shadows of *d*, *e*, *a*, and *b*.

157. The plan of this parallelogram may be determined in the same manner, or by the other constructions explained for determining the projections on the other co-ordinate plane from those already determined on the first, and which are sufficiently indicated in the figure to render further description of them unnecessary.

158. If L represent a luminous body, and P a point, then



by imagining a plane to pass through them, the intersection of that plane with the plane on which the shadow is cast will cut the ray LP in Q, the shadow of the point. To determine this intersection, we have only to draw two parallel lines through L and P, in *any* direction, and determine the points *l* and *p*, or *l′*, *p′*, in which these parallels meet the plane of the shadow: then *l p*, LP being drawn, they will cut each other in Q, the shadow of the point. This is the principle employed in the following construction.



159. Let *a b c d e f g* be the perspective projection of a cube, C being the centre of the picture, CV the distance of the picture, P₁ X the vanishing line of the face *a b c d*, and Y Z its intersecting line; while Y′ Z′ is that of the face *e f g*, parallel to the former. Let Y X and W Z be given as the vanishing and intersecting lines of a plane, on which the shadow of the cube, as cast by the luminous body * given in position, is to be determined.

160. XZ, XW, being drawn, will represent the lines in which the plane of the shadow intersects those of the parallel faces of the solid (94). If we suppose planes parallel to that of the picture to pass through the various points of the cube, as *a*, these will intersect the two original planes in lines, as *a α*, *a a′*, parallel to Y Z, Z W, and a line, *aa′*, through the point of the cube, parallel to the auxiliary vanishing line, will meet *a a′* in the point *a′*,* which will be the oblique projection of the point *a* on the plane of shadow. Therefore by drawing lines through the points *a*, *b*, *c*, *d*, parallel to Y Z, to cut X Z in *α*, *β*, .. *δ*, then lines parallel to W Z, through *α*, *β* … *δ*, will cut lines parallel to WC′, drawn through *a*, *b*, *c*, *d*, in the oblique projections of those points on the plane of the shadow, and by referring *e*, *f*, *g* … to WX, in the same way, we obtain the oblique projections of the other angles of the cube.

161. Since the sides of the cube *ab*, *cd*, *ef*, &c. are parallels, their oblique projections will be parallels (59), consequently the images of these parallels *a′b′*, *c′d′*, *e′f′*, &c. will have a common vanishing point P′₁ in the vanishing line of

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* That is to say, *a′* is the *perspective image* of the oblique projection of the original point of which *a* is the perspective image.

the plane in which the oblique projections lie; for the same reason, *a'd'*, *b'c'*, *f'g'*, &c. will have a common vanishing point P'_2 in YX. Now it is obvious that the vanishing points P'_1, P'_2 are, by an extension of the principle, the oblique projections on the plane of the shadow of the vanishing points P_1 P_2 of the original sides of the cube; consequently the former may be determined from the last-named vanishing points by simply drawing lines through them parallel to WC to cut YX in P'_1, P'_2.

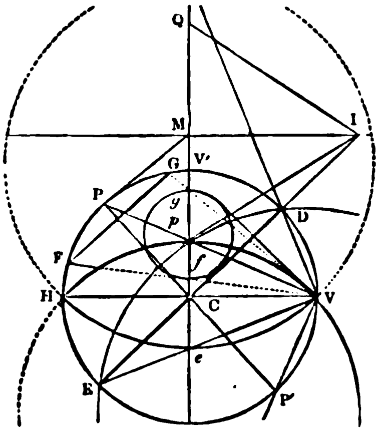
162. If *k* had been given as the image of the point in which a line through the luminary perpendicular to the plane YZ met that plane, the image * of the luminary would be determined by making *k**, drawn to the auxiliary vanishing point Q, the image of the given perpendicular height of the luminary above the original plane. A line through * parallel to WC' will meet C'*k* produced in *l*, the oblique projection of the luminary on the plane YZ.* Its oblique projection *l'* on the plane of the shadow may be either determined as those of *a*, *b*, *c*, *d*, &c. were, or by drawing a line, as *al*, at pleasure, to cut the vanishing line XP in some vanishing point; this vanishing point may be transferred to XY by a parallel to CW; then a line drawn through *a'*, the oblique projection of *a*, to this transferred vanishing point, will cut **l* produced in *l'*, the oblique projection of the luminary on the plane of the shadow.

163. Draw lines through *l'* and through the oblique projections *a'*, *b'*, *c'*, *d'*, *e'*, &c. intersecting each such line by the luminous ray **a*, **b*, **c*, &c. in the shadows *a''*, *b''*, *c''*, &c. of the angles of the cube, and these points being joined, the figure thus produced will be the image of the shadow of the cube on the plane as proposed.

164. The oblique projecting lines *aa'*, &c. were assumed parallel to the picture and its auxiliary plane, simply for facility of construction, or else the points *a*, *b*, *c*, *e*, *f*, &c. might, as well as the luminary, have been projected on the plane of the shadow by lines in any direction, provided these lines were parallels according to the above principle (158).

165. Draw lines through * and P_1, P_2, and Q, the vanishing points of the sides of the cube; then the images, as *a''b''*, *c''d''*, *e''f''*, of the shadows of the parallel lines of the original solid will meet in a point in the corresponding line drawn through * and the vanishing point of those originals. For the planes passing through * and the parallels *ab*, *cd*, *ef*, &c. must intersect in a common line, passing through * and parallel to those originals: this common intersection will therefore have the same vanishing point, P_1 as those originals: the line *P_1 represents that common intersection. Now the shadows *a''b''*, *c''d''*, *e''f''* are the intersections of the before-mentioned planes by another, namely, by the plane of the shadow, and these intersections, *a''b''*, *c''d''*, &c., must meet each other in a point in *P, the common intersection of the planes passing through * and the original lines. The same reasoning applies to the other shadows of the corresponding parallel sides of the cube.

166. In the article Map the different modes of referring portions of the surface of a sphere to a plane have been explained; we shall here confine ourselves to giving a few practical theorems on this subject as connected with the subject before us.



167. In this figure the circle EFGDV is the intersection of a sphere with the plane of the picture, supposed to pass through its centre. The vertex is supposed to be in the surface of the solid, in a diameter perpendicular to the plane of the picture; C is therefore the centre of the picture, and CV the distance of the vertex, brought into the plane of the picture by the auxiliary vanishing plane (95) being turned round on the diameter V'V', which is an auxiliary vanishing line. It is obvious that if any great circle, the plane of which passes through the vertex, be turned round on the diameter ED, which it forms by its intersection with the plane of the picture, till the two coincide, the vertex will coincide with the extremity of a diameter PP at right angles to the former ED.

168. It is shown [Subcontrary] that under this condition of position of the vertex, every original circle of the sphere, whether a great or a small one, is perspectively projected into a circle; and since a circle is given, when either its centre and radius or three points in its circumference are found, the constructions for drawing these projections are simple and direct.

169. Let HV be the intersecting line of a great circle, supposed to be inclined to the plane of the picture in a given angle; to find its projection. Draw V'V' perpendicular to HV for the auxiliary vanishing line (95) of the given plane. Draw the diameter ED to make the angle V'CD equal to the given one. ED will be the intersection of the original and auxiliary vanishing planes, brought into the plane of the picture along with the vertex V. Draw the rays VD, VE, to cut the auxiliary vanishing line in *d* and *e*, then *d* and *e* will be two points in the projection of the circle, while that image must pass through the points H and V (78). Since EVD is a right angle, and the image passes through V, *ed* must be a diameter of that image, as is indeed obvious from its bisecting the chord HV at right angles.

170. Let FG be the diameter of a small circle, produced by its intersection with the auxiliary plane, the small circle in this figure being assumed parallel to the plane of the large one last projected: by drawing VF, VG, to cut CV' in *f*, *g*, we get the diameter of the circle which is the image of the original one.

171. Let PP, perpendicular to ED, FG, be the common diameter to a series of great circles or *meridians;* that common diameter lying in the auxiliary vanishing plane, and being brought along with it into the plane of the picture. The points *p*, *p** will obviously be the images of the extremities of this common diameter, and the images of all these meridians must pass through *p*, *p*. To draw the image of such a meridian forming any proposed angle with the auxiliary plane, which is obviously that of one such meridian—Draw PM perpendicular to PP, to cut CV' produced in M; through M draw a line perpendicular to CV'. This line MI will be the intersecting line of a plane tangential to the sphere at the extremity of the given diameter of the meridians. Now this plane will be cut by the meridians in lines meeting in P and making plane angles with each other, measuring the dihedral angles at which the meridians themselves are inclined to each other. Make MQ in CV' equal to MP, then Q will be the point P brought into the plane of the picture by the tangential plane being turned round on MI. QI, drawn to form the proposed angle with IIQ, will represent the intersection of the tangential plane with that of the meridian; the diameter ED drawn through I will consequently be the intersecting line of the plane of the meridian: a circle drawn through E, D, *p* and *p* will be the image of that meridian.

172. The point I may however be found more directly, for since the angles VHP MPV are equal, VC*p*, VPH both right angles, and HVP common to the two triangles VCP, VHP, the remaining angle V*p*C, or P*p*M, is equal to PHV or to MP*p*, therefore the triangle MP*p* is isosceles or MP is equal to M*p* or to MQ by construction. Hence the angle M*p*I is equal to MQI, or to the angle of inclination of the two meridians, and *p*I may be drawn accordingly at once to make that proposed angle with CM. If the planes of the meridians are mutually perpendicular, the point I will be at an infinite distance from M; HV perpendicular to CM will in this case be the intersecting line of the second

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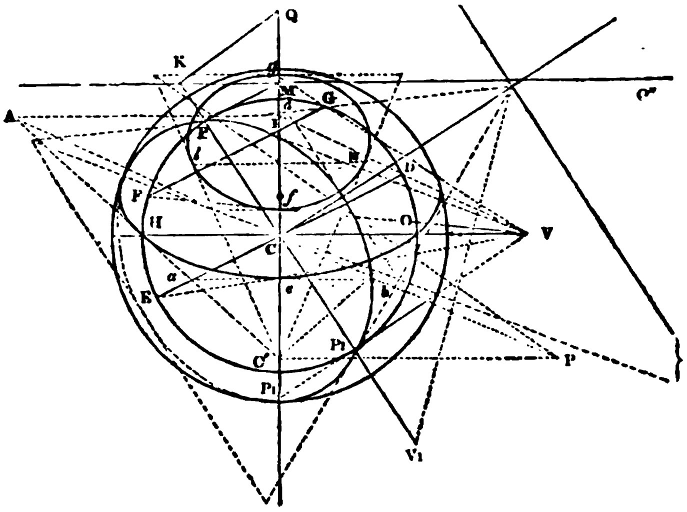
* For since **k* is perpendicular to the original plane YZ, and **l* is parallel to the auxiliary vanishing line, and therefore to the auxiliary vanishing plane, a plane passing through these lines must be perpendicular to the original plane, and parallel to the auxiliary vanishing plane; it must consequently cut the original plane in a line perpendicular to its intersecting line; this intersection will therefore have C' for its vanishing point.

* The other *p* is out of the figure, being the intersection of VV, with duced.

meridian; and a circle drawn through H, V, *p*, *p* will be its image.

173. By these constructions, the meridians and parallels of latitude for a map on the *Stereographic* projection can be drawn, whether the axis of the globe be parallel or inclined in any proposed angle to the plane of the picture.

174. When the vertex is without the surface of the sphere, all the circles on the surface are projected into right lines or ellipses, and the axes of these ellipses are readily found by the principles of perspective projection: the plane of the picture is assumed, as before, passing through the centre of the sphere, and vertical to the line joining the centre and vertex. Let EPDO be the circle, formed by the intersection of the plane of the picture with the spherical surface; CV is the assumed distance of the picture, the auxiliary plane being turned round on the auxiliary vanishing line C′M: ED, FG being the intersections of any given great circle, and of a small one parallel to it, with the auxiliary plane. The planes of these circles being inclined to that of the picture in an angle equal to MCD.



175. Through V draw VC′ parallel to DE, to cut the auxiliary vanishing line in C′, the centre of the vanishing line of the original planes of the given circles, C′P drawn parallel to HO, the intersecting line of the plane will be the vanishing line, and if C′P be made equal to C′V, the principal radial, P, will be the vanishing point of all lines making angles of 45° with the intersecting line; consequently PA drawn through C will be the indefinite image of the diagonal of the square circumscribing the original circle. Draw the rays VD, VE, to cut the auxiliary vanishing line in *d*, *e*; through these points draw AB, *ab*, parallel to HO, and draw C′A, C′B, through H and O; then the rhombus AB*ab* will be the image of the circumscribing square, and the elliptic image of the circle will touch its side in the points H, *o*, *d*, and *e*; *de* is the conjugate axis of this ellipse (121); the major axis will therefore bisect *d e* at right angles. Produce FG to cut C′M in I, through I draw a line parallel to HO for the intersecting line of the plane of the given small circle, set off on it each way from I the half of FG, then lines drawn through these points thus marked to C′, will be the images of the two sides of the circumscribing square which are perpendicular to the intersecting line (95); the images *f*, *g*, in the other two sides, are found by the rays VF, VG; lines through *f* and *g* parallel to HO will complete the image of the circumscribing square; the elliptic image must be drawn accordingly to touch its opposite sides in *f*, *g*, *l*, and *n*, *fg* being the conjugate axis.

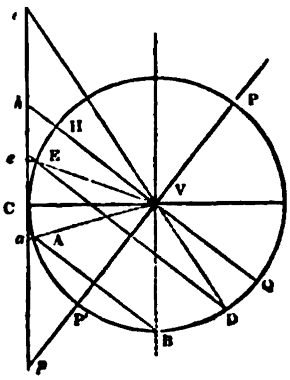
176. Draw the diameter PP perpendicular to DE, as the common diameter of a series of meridians, the planes of which are perpendicular to that of the great circle *d*H*e*O, this common diameter lying in the auxiliary plane, and being brought with it into the plane of the picture; *p*, *p*, will therefore be the images of the poles of the circles ED, FG, &c., and the images of all the meridians must consequently pass through these points.

177. The intersecting line of the plane of any of these meridians making any proposed angle, equal to MQK, with the auxiliary vanishing plane, may be found by the same construction employed for the same purpose in stereographic projection. Let ED be taken to represent such an intersecting line found by the construction alluded to. Make CV_1 equal to the distance of the vertex, make the angle CV_1C'' equal to MQK, or to that which the original plane makes with the auxiliary plane, VC'' cutting the auxiliary vanishing line CC″, produced in C″, the centre of the vanishing line of the plane, which vanishing line must accordingly be drawn through C″ parallel to P_1P: by means of this vanishing line and its principal radial V_1C'', the image of the circumscribing square can be found, and the ellipse drawn tangents to its sides.

178. The cone of rays from the vertex, tangential to the surface of the sphere, will be cut by the plane of the picture in a circle concentric with EPDO, and the diameter of this outline of the sphere will be found by drawing tangents from V to the circle EPDO, to cut the auxiliary vanishing line in its vertices. Now the elliptic images of all great circles must touch this outline, since the originals must touch that of the outline; consequently the major axes of the elliptic images of such great circles must be diameters of this circular outline: these axes may be determined by the properties of the curve from the data before obtained.

179. When this projection is used for the construction of maps, the opposite concave hemisphere, beyond the plane of the picture, is represented; but if the sphere be intended to be projected as an object, the convex surface towards the vertex and bounded by the visible outline should be drawn.

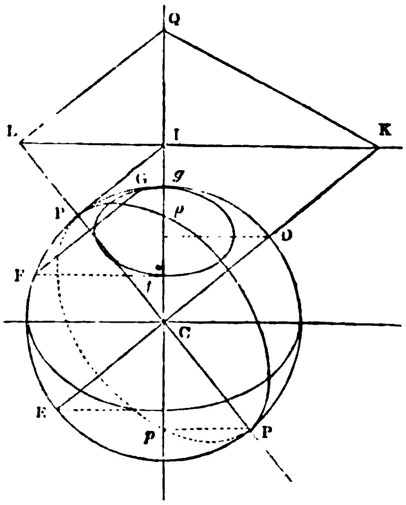
180. When the vertex is at the centre of the sphere, all great circles are projected into right lines (93), and the small circles are projected into conic sections. Let the circle AHPD represent the intersection of the sphere with a plane passing through the distance of the vertex VC, and therefore perpendicular to the plane of the picture: If PP_1 be the common intersection of a series of meridians, the projections of these great circles will be right lines passing through *p*, the projection of P, or through the intersection of PP with the plane of the picture; and these projections of the meridians will cut the straight line [illegible] the intersection of the plane of the equator HO with the plane of the picture in the tangents of the angles the meridians



make with the auxiliary plane AHPO, V*h* being radius. Hence the constructions for drawing these meridians are extremely simple.

181. Let AB, ED, &c., represent parallels of latitude; these will constitute the bases of so many right cones, having the vertex V, or the centre of the sphere, for their common vertex, the projections of these small circles will be ellipses, parabolas, or hyperbolas, according as the opposite slant sides of the cones are inclined or parallel to the plane of the picture. The projection of ED will be opposite hyperbolas (118), *e*, *d* being the vertices of their major axis. If BV be parallel to *p d*, the projection of AB will be a parabola, otherwise an ellipse, provided VB meet the plane of the picture on the same side of C that VA meets it. All these curves will have the auxiliary vanishing line for their common major axis; they can therefore be drawn with facility either by constructions derived immediately from the theorems relating to the curves as sections of the line, or else points in their projections may be found by the simplest principles of perspective projection.

182. When the circles of the sphere are projected on a plane by lines perpendicular to it, the position of the plane is immaterial, the sections of the cylindrical surfaces formed by the projecting lines being unchanged by any variation in the position of the plane, provided it be vertical to the projecting lines. However, to indicate the analogy between the principles employed in the constructions in this case, and those that have preceded, we shall suppose the plane of the picture, or the co-ordinate plane, to pass through the centre of the sphere.



183. Let EFGD be the great circle that is the intersection of the plane with the solid, and also representing any other which is perpendicular to the co-ordinate plane, supposed to be turned round on their common diameter till they coincide. If PP, supposed to be in a plane perpendicular to that of the projection, be the common intersection of any series of meridians, P*p*, P*p*, will be the projecting lines (1) of its vertices brought into the co-ordinate plane by the rotation of the plane in which these three lines lie, on CQ its trace (18). The projections of all these meridians must therefore pass through *p* and *p*. Now if the same construction be made in this case as was explained in the corresponding problem in the stereographic and globular projections (171), we shall obtain ED as the intersecting line (81) or trace (18) of the plane of a meridian forming any proposed angle IQK with the auxiliary plane, and ED will be the major axis of the elliptic projection of that meridian (49); the semi-conjugate is the cosine of the angle at which the plane of the circle is inclined to that of projection.

184. The other methods of delineating maps, on the supposition of the *development* of a conical or cylindrical surface, supposed to touch the sphere, are foreign to the subject of projections, and consequently are not here introduced.

PERSPICILLA, Mr. Swainson's name for a genus of *Water-chats* (*Fluvicolinæ*).

Generic Character.—*Bill* long, compressed on the sides. *Nostrils* naked. *Wings* rounded, broad; the scapular quills as long as the primary quills. *Tarsi* very long, smooth. *Tail* rather short. (Sw.)

Example, *Perspicilla leucoptera*, Sw.

Locality, South America.

PERSPIRATION, CUTANEOUS. [SKIN.]

PERTH. [PERTHSHIRE.]

PERTHSHIRE, a large and central county in Scotland, bounded on the north by the shires of Inverness and Aberdeen; on the east by Forfarshire; on the south-east by Fifeshire (from which, in one part, it is separated by the Frith, or æstuary, of the Tay), and by Kinross-shire; on the south by Clackmannan and Stirling shires; on the south-west by Stirling and Dumbarton shires; on the west by Argyleshire; and on the north-west by Inverness-shire. The form of the shire is compact; its greatest length from north to south is from the border of Inverness-shire, north by east of Loch Garry, to Balguir Muir, west of Stirling, 53 miles; the greatest breadth from east to west is from the border of Forfarshire, between Meigle and Glamis, on the road between Perth and Forfar, and the border of Argyleshire, near Loch Lydoch, 62 miles; or from the border of Fifeshire, near Abernethy, to the border of Argyleshire, north-west of Loch Lomond, which is also about 62 miles. (*Map of Scotland*, published by the Society for the Diffusion of Useful Knowledge.) A small detached portion of the county lies on the northern shore of the Frith of Forth, between the shires of Fife and Clackmannan, and another small detached part is surrounded by Stirlingshire; while a small detached portion of Forfarshire is included in the boundaries of Perthshire. The area of Perthshire is estimated at 2538 square miles, or 1,624,320 English acres. (Playfair's *Description of Scotland*, M'Culloch, *Statistical Account of the British Empire*, gives the area at 2588 square miles for the land, and 50 square miles of lochs.) The population in 1801 was 126,366; in 1811, 135,093; in 1821, 139,050; and in 1831, 142,894 (*Pop. Returns*), giving about 56 inhabitants to a square mile. This population is however very unequally distributed; twenty parishes in the western and northern parts of the county, comprehending about two-thirds of the area of the county, have a population of 44,902, giving from 26 to 28 inhabitants to a square mile; while in the remaining small but numerous parishes of the south-east the population may be estimated at from 110 to 120 to a square mile. The county lies between 56° 2′ and 56° 57′ N. lat., and between 3° 2′ and 4° 50′ W. long. Perth, the capital of the county, is on the river Tay, in 56° 24′ N. lat., 3° 26′ W. long.; 43 miles from Edinburgh by Queensferry and Dumfermline, and 442 miles from London.

In *The Beauties of Scotland* (Edinb. and Lond., 1805-8), and in the *Gazetteer of Scotland*, compiled by Messrs. Chambers (Edinb., 1832), the dimensions and area of the county are exaggerated in a most extraordinary manner; the length (from east to west) and breadth are given at 77 and 68 miles respectively, and the area at 5000 square miles, or 3,200,000 acres.

Surface and Geological Character.—The whole of the county except the immediate vicinity of Perth is hilly, if not mountainous. The Ochill Hills or Mountains traverse the south eastern part between the Forth and the Tay; they rise in some parts to an elevation of more than 2300 feet above the level of the sea. The Grampians form the northern and north-western boundary of the county, separating it from Aberdeen and Inverness shires. Glass Mluel, Benu-arn-More, Scarcsoch (3390 feet), and Bruoch-Carruvan are in this part of the range. The western half of the county is overspread by the mountains of the Western Highlands, among which are Ben Venue, Stuich a Chroin (3171 feet), Ben Ledi (2863 feet), Ben Vorlich (3180 feet), Ben More (3819 feet), Ben Lawers (3945 feet), Schihallien or Schiehallion (3513 feet), Ben Chualach, Ben Vollich, and Dunichmore. Cairn Gower in the Ben y Gloe Mountains in Athol Forest, south of the Grampians, has an elevation of 3690 feet. The Sidlaw Hills are on the east side of the county near Forfarshire; Dunsinnan or Dunsinane hill, one of these, immortalized by Shakspere in his 'Macbeth,' is 1114 feet above the level of the sea, and nearly 800 feet above its base. Upon its oval and conical summit, 507 feet in length by 267 medium breadth, Macbeth erected his castle. Birnam hill, near Dunkeld, is stated by some authorities to be above 1500 feet high.

These mountainous districts are intersected by long winding narrow vales, or 'glens,' through which the streams flow, or by 'straths,' or wider valleys. Strathallan in the south part of the county separates the Ochill Hills from the mountains of the Western Highlands; Strathearn extends across the centre of the county from west to east; Strath Tay, and lower down Strathmore (which last extends eastward into Forfarshire, or rather through it), form the valley of the Tay; and Strath Airdle is in the north-eastern part of the county. In the northern part of the county are Glen Shee and Glen Beg, Glen Fernal, Glen Tilt, Glen Bruar, and Glen Erochkie. In the west are Glen Lyon, Glen Lochy, Glen Dochart, Glen Falloch, and Glen Artney. Glen Tilt communicates with Strath Tay by the well-known pass of Killicrankie. The road here is cut out of the side of one of the contiguous mountains; and below it, at the foot of a high precipice, in the bottom of the ravine, the river Garry dashes along.

The north-western and northern parts of the county belong to the great primitive district of the north of Scotland. Granite is found underlying the peat of the extensive waste of Rannoch Moor in the west part of the county; but the predominant rock in this district is mica-slate, skirted by clay-slate and chlorite-slate, both which pass insensibly into mica-slate. Schiballien, Ben Lawers, the hills round Loch Tay, and many of the mountains in the Grampian range are composed of mica-slate, intermixed with hornblende-slate and quartz-rock, and in some parts with a small portion of crystalline limestone. Chlorite-slate is the predominant rock of Craig Cailleach, near Killin, intermixed however with rocks consisting of hornblende and felspar, and of micaceous schist mixed with hornblende. The rocks about Aberfoyle consist of irregular alternations of grauwacke and grauwacke slate with clay slate; the beds are in various positions and elevated to high angles: quarries of fine roofing clay-slate are wrought here. On approaching the shores of Loch Cateran, or Catrine, the rock presents an appearance approaching to that of mica-slate. At Ben Ledi the structure still more resembles mica-slate; and beyond this, east of Loch Lubnaig, true mica-slate occurs, and occupies the whole district as far as Perth. A highly elevated range of breccia may be traced in various places, separating the primitive district from the secondary district in the south-east of the county. (*Geological Transactions*, vol. ii., pp. 436, 446; vol. iv., pp. 128, 129.)

The district to the south and east of the breccia is occupied by beds of sandstone. Basaltic rocks may be traced in a north-east direction, extending, though not continuously, through this district, sometimes capping hills of sandstone, sometimes forming entire hills of considerable magnitude, and sometimes irregularly interstratified with sandstone beds. The Ochill Hills in the south-east part of the county consist chiefly of porphyry and amygdaloid; and the Hill of Kinnoul near Perth is an amygdaloid containing numerous nodules of agate and carnelian. M'Culloch's *Statistical Account of the British Empire.*) Some portions of the county near the south-eastern border are comprehended in the coal-field of Fifeshire (M'Culloch, as above); and some authorities mark a narrow district extending south-west from Camry, or Comrie, near Crieff, in the direction of Dumbarton, as occupied by the coal-measures and associated formations. ('Map' given in *Geological Transactions*, vol. iii.)

Hydrography.—This county is almost entirely comprehended in the basin of the Tay. A small portion on the south-west side, drained by the streams which flow into Loch Lomond, belongs to the basin of the Clyde; and the more important district of Menteith in the south is included in the basin of the Forth.

The Tay rises in a small loch or lake near the extreme western part of the county on the border of Argyleshire, and flows east and east by north 20 miles, through Loch Dochart into Loch Tay. In this upper part of its course it does not take the name of Tay, but is known as the Dochart. It is joined just before it enters Loch Tay by the Lochy, or Lochie, which rises a little to the north of Loch Dochart, and has a circuitous course of about 16 miles. Loch Tay is a long narrow lake embosomed in mountains, having Ben Lawers near its north-western shore; its length from south-west to north-east is about 14 miles; its average breadth is about one mile. (*Map of Scotland*, published by the Society for the Diffusion of Useful Knowledge.) Other authorities (*New Statistical Account of Scotland*, 'Perthshire,' p. 454) make the dimensions rather greater. Its surface may be estimated at 15 to 17 square miles, or 10,000 acres. Mr. M'Culloch (*Statist. Account of the British Empire*) gives its surface at 20 square miles, but this we believe to be too great. The banks of the lake are steep and shelving, and the depth of water is supposed to be in some parts not less than 600 feet. It is fed by several mountain streams, and abounds with fish; its surface is at times agitated in a violent and uncommon manner. From the north-eastern or lower end of Loch Tay, the river Tay issues, now under its proper designation, and flows through Strath Tay, or the Vale of Tay. Soon after leaving the loch it is joined by the Lyon; and turning more to the east receives the Tumel, or Tummel, 15 miles below Loch Tay. Both these rivers join the Tay on its left bank. From the junction of the Tumel the Tay flows south-eastward six miles, through several small lakes, receiving the Braan, or Brand, on its right bank; and then, flowing eastward 12 miles more through Strathmore (or the great valley), receives the Isla. From the junction of this stream the Tay turns abruptly to the south-west, south, and south-east, and flows to Perth 12 miles below the junction of the Isla. Its course below Perth is chiefly eastward, and, including the Frith or æstuary of Tay, may be estimated at 26 miles; so that its whole length from the head of the Dochart to the open sea may be estimated at 11[illegible] miles. Just above Perth, the Tay receives the Almond, and several miles below it the Earn, both on the right bank. The Tay is computed to send to the sea a greater volume of water than any other river of Great Britain. Its course above its junction with the Braan is very rapid, but below that point it becomes less so. It is navigable to Perth for vessels of 100 tons, and to Dundee, which is on the shore of the æstuary, for vessels of 500 tons. There is a bar at the mouth, and the navigation is rather difficult, partly from the sand-banks in its channel, and partly from the strength of the tides.

The tributaries of the Tay deserve notice from the system of lakes with which they are connected. The Lyon rises on the western border of the country, and flows east by north through Glen Lyon 28 miles into the Tay. Not far from its source, it flows through Loch Lyon, a small lake about 2 miles long from south-west to north-east. The Tumel issues from Loch Lydoch, a large irregular sheet of water, the greater part of which is included in the border of Argyleshire, adjacent to the wild table-land of Rannoch Moor, 1000 feet above the level of the sea. The surface of Loch Lydoch is perhaps somewhat more than 6 square miles. The Tumel issues from its north-eastern end, and flows eastward about 6 miles into Loch Rannoch, passing in its way through one or two smaller lochs. Loch Rannoch is a long narrow sheet of water, extending 9 miles from west to east, and rarely if ever exceeding a mile in breadth. It abounds with trout of the largest size. Two streams, one flowing into the Tumel, between Lochs Lydoch and Rannoch, and the other into Loch Rannoch itself, serve to convey to the Tumel the superfluous waters of Loch Ericht, another long narrow sheet of water extending in length 14 miles from north to south by one mile in breadth, partly in Inverness-shire and partly in Perthshire. This lake occupies a hollow which cuts transversely the great Grampian chain, while most of the other principal valleys occupied by the streams and lakes of the county run parallel to that chain, and separate it from subordinate lateral ranges, or these ranges from each other. From the eastern extremity of Loch Rannoch, the Tumel flows eastward 10 miles into Loch Tumel, 2 miles long from west to east and half a mile broad, and from thence 12 miles farther east and south into the Tay. Its whole course from its issuing from Loch Lydoch is nearly 40 miles. Between Loch Tumel and the Tay it receives on its left bank the Garry, which has a course of about 30 miles, flows through Loch Garry, a small narrow lake 3 miles long, extending, like Loch Ericht, north and south, and waters Glen Garry, in its course through which it receives on its left bank the streams which water Glen Bruar and Glen Till, and on its right bank the Feachorie, which waters Glen Erochie.

The Braan or Brand, 20 miles long, waters Strath Braan, and serves as an outlet to Lochs Freuchie, Kennard, Skiach, and some others, all small. The Isla, one of the most important feeders of the Tay, belongs chiefly to Forfarshire; only about 14 miles of its course are upon or within the border of Perthshire. Of its tributaries, the Shee or Ericht belongs to Perthshire; it is nearly 30 miles long, and waters Glen Shee; it receives the Airdle, 20 miles long, which rises at the foot of Cairn Gower, in the Ben y Gloe mountains, and waters Strath Airdle. The Almond rises not far from the south-east shore of Loch Tay, and flows about 25 miles east into the Tay. It has no lakes connected with it.

The Earn rises in the western part of the county, and flows east about 5 miles into Loch Earn, which is 7 miles long from east to west, by about one mile broad, and from thence east 33 miles into the Tay below Perth. It waters Strathearn.

The district of Menteith in the south belongs to the basin of the Forth, and is watered by the Teith, which rises just within Argyleshire, and flows 4 or 5 miles, into Loch Catrine or Katrine, a winding and picturesque sheet of water, 8 miles long, from west-north-west to east-south-east, which has become celebrated as the scene of Sir W. Scott's 'Lady of the Lake.' Trout and char are found in it. From the south-east corner of Loch Catrine the Teith flows 9 miles through the Trossachs pass, and at the foot of Ben Venu; it passes through the small Lochs Achray and Vennachar (in which are found trout, salmon, and pike), to Callander, where it is joined by a stream from Loch Voil and Loch Lubnaig, which lie north and north-east of Loch Catrine, and are each about 5 miles long. From Callander the Teith flows south-east 13 miles into the Forth above Stirling; its whole length is about 34 miles. Pearl mussels were formerly fished in this river to a considerable extent. The Allan, a small feeder of the Forth, waters Strath Allan on the north-western and western side of the Ochill Hills; the Devon, another small feeder, waters the valley on the south-eastern side of the same hills; and the Forth itself flows just upon or within the southern boundary of the county for about 30 miles, from the neighbourhood of Ben Lomond to below Stirling. The Allan abounds with trout and some young salmon, and sea-trout are taken occasionally, and various sea-fish are taken in the estuary of the Forth. The Falloch Water, which flows through Glen Falloch into Loch Lomond, is near the south-western border of the county.

The aggregate area of the lakes of Perthshire is estimated at 56 square miles, or 35,000 English acres. The principal of these 'are nothing more than long valleys between the chains of mountains, in which the river at the foot of the mountain, not finding a ready passage for its waters, spreads itself out so as to assume a stagnating form; hence the lakes are usually of great length, but of moderate breadth.' Loch Tay and Loch Ericht are examples of lochs of this kind. When the margin of the lakes exhibits not a steep ascent, but a gentle slope, vegetation is commonly luxuriant, from the length of the days in summer, and the shelter afforded by the low situation. (Forsyth's *Beauties of Scotland.*) Scenes of uncommon beauty are then displayed, such as those which Scott has so accurately and happily described in his 'Lady of the Lake.' The wood round Loch Catrine is made into charcoal and consumed in the Carron iron-works.

There are several falls in the rivers of Perthshire. Those of the Bruar and the Tummel are very picturesque; and the falls and rapids of the Devon, called the Devil's Mill, the Rumbling Bridge, and the Cauldron Linn, are worth a visit.

Soil; Produce; State of Agriculture.—Owing to its mountainous character, a large portion of this county is ill adapted for cultivation. There are very extensive tracts of moor, bog, and moss, though they are progressively diminishing. A large space is occupied either by natural woodlands or by plantations, chiefly the latter, for the ancient forests have been almost entirely destroyed. The plantations have been much extended of late years, and many districts have been covered with them. The late duke of Athol planted above 15,000 acres, of which 2000 acres are in the parish of Blair of Athol, which comprehends the site of the ancient and extensive forest of Athol. In this wild tract the number of red deer is very considerable (said to be 7000); the roes and fallow-deer are also numerous in the plantations. The fox, the wild cat, the badger, the otter, the martin, the polecat, the weasel, and the common and Alpine hare are numerous; and the rabbit, the squirrel, and the rat have lately made their way into this part of the county, where they are becoming troublesome. The eagle builds his nest on the mountain tops, and the kestrel by the falls of the Bruar and in Glen Tilt. Red and black game, the ptarmigan, the plover, and the partridge are abundant.

The natural wood of Athol forest consists chiefly of oak, birch, aspen, and alder. Oak ceases to grow as a natural wood at about 400 feet above the level of the sea, at which the region of the birch seems to commence. There are numerous and tolerably extensive woods of birch to the north of Killikrankie pass. The alder, which abounds on the banks of the Garry, is dwarfish in its growth. Lime, elm, and plane trees are unusually large and numerous in the park of Blair Castle; and the surrounding hills are covered with Scotch fir, spruce, and larch. The Scotch fir was formerly the favourite tree for plantations, but experience has shown that its growth upon light soil and moorish grounds is stunted; the larch is therefore now chosen for dry soils, and the spruce where there is moisture. Oak, ash, birch, beech, and elm are also planted, though not so extensively as the fir tribe.

The cultivated land in the county is estimated at from 230,000 to 360,000 acres, or about one-third of the whole surface. The most valuable tract is the 'Carse of Gowrie,' the district watered by the Isla and its tributaries the Ericht and the Airdle, and comprehending a portion both of Forfarshire and Perthshire. It is a low alluvial district, the finest, in an agricultural point of view, of any in Scotland, and equal to any tract of land in the United Kingdom. The lower part of Strathearn, or the vale of Earn, another low alluvial tract, is scarcely inferior to the Carse of Gowrie. The vale of the Tay, above Perth, and the vales of the Forth and Teith, contain extensive tracts of low alluvium or of gravelly sandy loam. There is little cultivated land in the Highland districts.

Many of the estates are large, but there are also numerous smaller proprietors. The size of the farms varies from 50 to 500 acres; and in the lower districts they are universally held on lease, commonly for fifteen or nineteen years; some of the small Highland occupiers are yearly tenants. The farm buildings in the lowlands are usually substantial, and otherwise excellent, but not so in the Highland tracts. The Carse of Gowrie, Strathearn, and the valleys of the Teith and the Forth yield good wheat and beans; but in the midland districts oats and barley are the principal grain crops. Turnip cultivation has been carried to a considerable extent, and bone-dust has been introduced as manure for this crop; but lime, which is imported at Perth from the Frith of Forth or the north of England, is chiefly employed. The chief article of agricultural produce is however the potato, of which great quantities are yearly shipped for London. The sort generally cultivated is the Perthshire red. This crop forms the chief dependence of the farmer; but it has of late years been very precarious, from defect of vegetation in the sets planted. Some good crops of mangel-wurzel have been raised, and the cultivation of the artificial grasses is improving and extending. (*New Statistical Account,* 'Methven Parish.') The best farmers use a rotation of crops of five or six years, but some keep the land in grass only one year at a time, taking a white crop every alternate year. (*Ibid.,* 'Redgorton Parish.') In the stiff flats of the Carse of Gowrie the rotation is sometimes of seven years. (*Ibid.,* 'Longforgan Parish.') Considerable quantities of apples, pears, and other fruit are raised in the valleys and low grounds, particularly in Gowrie. The use of hedges for enclosures seems to be gaining ground.

There is no breed of cattle peculiar to the county. The stock varies with the varying quality of the pasturage. Many Ayrshire cows for the dairy have been introduced of late years into the lowlands; and some of the best farmers have now a cross-breed from the Teesdale or short-horned and the Ayrshire. (*New Statistical Account,* 'Methven' and 'Redgorton.') The West Highland breed is that commonly fed on the Highland pastures. The number of sheep has been vastly augmented, chiefly by the alteration in the system of farming, and the laying out of sheep-walks in the Highland tracts. The usual breed in these districts is the black-faced Tweedale breed, which has displaced the small white or yellow-faced mountain sheep generally kept of old time; but the Tweedales have of late been partially displaced by the Cheviots. There are some flocks of Leicesters and Southdowns; a few of the former are kept by many of the lowland farmers. The Southdowns chiefly belong to the nobility and other large landed proprietors.

Communications.—The roads of this county have been improved of late years as much as in any county of Scotland. The road from Edinburgh by Queensferry and Dunfermline to Perth enters the county a few miles south of the last-named town. Roads from Dundee, St. Andrews, and from Glasgow, by Stirling, converge at Perth.

From Perth there is a road by Forfar, Brechin, and Stonehaven to Aberdeen; another road follows the valley of the Tay by Dunkeld, and afterwards those of the Tumel and the Garry, through the pass of Killikrankie to Fort Augustus, Inverness, and the Northern Highlands; while a third follows the valley of the Tay and the Dochart into Argyleshire. Three roads lead from Stirling into the Western Highlands through Menteith; one through Aberfoyle to the banks of Loch Lomond, another to Glengyle at the head of Loch Cateran, and another, branching from this, joins the road through the valley the Tay into Argyleshire.

The only navigable rivers are the Tay and the Forth; the latter is navigable up to Stirling for vessels of 70 tons; but its course near that town is so winding that the navigation is little used except for steamers.

A canal has been proposed from the Tay, at Perth, to Crieff and to St. Fillan, at the lower extremity of Loch Earn.

Divisions, Towns, and other Localities.—Pertnshire was formerly divided into the six districts of Gowrie (east), Perth (south-east), Stormont (central), Strathearn (central), Menteith (south), Breadalbane or Braidalbin (west and central), Balquhidder (south-west), and Rannoch (north-west), each of which was a distinct Stewartry, that is, was in the jurisdiction of a distinct sheriff or steward; but the Act of 1748, abolishing hereditary jurisdictions, put an end to the legal existence of these divisions, though the names are still popularly applied to the respective districts, or are retained in the titles of the nobility. To these may be added the Highland district of Athol or Athole or Atholl, in the northern part of the county.

Perth, the capital, and Culross, are both royal burghs; Auchterarder, Abernethy, and Dunblane were formerly royal burghs; Dunkeld, Crieff, Longforgan, Cupar, and Alyth are burghs of barony; the other principal towns or villages are Auchtergaven, Blair-Gowrie, Callander, Errol, Doune, Kinnoul, Methven, Muthill, Scone, and Kincardine in Tulliallan parish.

Perth is on the right bank of the Tay. It is a place of great antiquity. The name is supposed to be derived from the Celtic Bhar-tatha, 'the height of Tay,' whence Bertha (the name given to the town in many antient writings) and Perth. Some have supposed, but apparently through misconception, that Bertha and Perth were different places. The town is said by some to have had a Roman origin, but this is not clear, though two Roman stations, the Orrea of Ptolemy and Richard of Cirencester, and the Ad Taum or Tavum of Richard, were in the neighbourhood. In the *New Statistical Account of Scotland* it is proposed to identify Perth with the Victoria of Richard, which others fix at Dealgin Ross on the Earn. Perth was for a time in the hands of the Picts; it was a burgh in A.D. 1106, and down to the death of James I. (A.D. 1437), was regarded as the capital of Scotland. It was the seat of a considerable trade, which the burgesses carried on in their own vessels with the Hanse Towns; and many Flemings and Germans settled here. The kings of Scotland unwisely subjected these foreigners to many restrictions.

In the war of Edward I. in Scotland, Perth was taken by that king immediately after the defeat of Wallace at Falkirk (A.D. 1298). He restored and strengthened the fortifications, and the town remained in the hands of the English, and was frequently the residence of the kings' deputies till A.D. 1311, when it was surprised and taken by Robert Bruce, and the fortifications were levelled with the ground. Perth was taken after the battle of Duplin, fought a short distance south of the town, on the Earn (A.D. 1332), by Edward Baliol, who repaired the fortifications, in which he was soon besieged by the Scots, who hoped to reduce him by famine. A victory gained by the English ships stationed at the mouth of the Tay to support him, compelled them to give over the enterprise. The town was soon after taken by the pasty of David Bruce, but subsequently reverted to the hands of Baliol and his party, and Edward III. of England was twice at Perth in his expeditions into Scotland (A.D. 1335-36). The Scots in the interest of David Bruce, under the command of Robert, steward of Scotland, afterwards King Robert II., took Perth (A.D. 1339) and entirely crushed the party of Baliol. Many years afterwards (A.D. 1396) the judicial combat took place between two parties of thirty men each from two clans of unascertained name, which has furnished a striking incident in Sir Walter t's 'Fair Maid of Perth.' (*Chronicles of the Canongate. Second Series.*) In 1425, James I., during the sitting of a parliament at Perth, arrested his cousin Murdoch, duke of Albany, ex-regent, and several of his family and partisans, including some of the most powerful barons in Scotland. Albany, two of his sons, and his father-in-law, the earl of Lennox, were executed. In 1437, James himself was assassinated in the Dominican monastery at Perth, by conspirators whom his unsparing reforms had provoked. After this event, Edinburgh became the seat of government, though Perth continued to be nominally the capital of the kingdom till A.D. 1482. In A.D. 1512, and in A.D. 1585-87, Perth was visited by the plague. Before the Reformation, there were several religious houses at Perth.

In August, 1600, Perth was the scene of that mysterious incident the Gowrie conspiracy to assassinate James VI. [James I. of England.] In 1644 it was taken by Montrose, after his victory at Tippermuir, and in 1651 was again taken by capitulation by Cromwell, after the defeat of the royalists at Burntisland. He built a fort near the town to overawe it, which fort, after the Restoration, Charles II. gave to the town. Having fallen into a dilapidated state, the materials were sold, and it was entirely demolished. The site is now levelled, and all traces of it are obliterated. Perth was occupied by the insurgent Highlanders in the rebellions of 1715 and 1745.

The town is on the right bank of the river Tay, and is connected by a handsome bridge of nine arches, 880 feet long, over that river with the Bridge-end of Kinnoul, which (Bridge-end) is included in the boundary of the modern parliamentary burgh. The streets of Perth are for the most part straight and conveniently laid out, well lighted with gas, and clean, with good side pavements. The houses are substantial, and those in the environs of the town, which are of later erection than those in the more central parts, are built of freestone, and present a handsome appearance. North and south of the town are two large public greens, called respectively the 'North Inch' and the 'South Inch.' The North Inch contains the race-course, and the South Inch is surrounded by stately trees and elegant villas. The principal public building is the church of St. John. The square tower is of antient but unascertained date, and is possibly part of the original church erected on this site; it has been surmounted at a later period by a pyramidal spire of wood covered with lead, and is furnished with bells and chimes. The body of the church has undergone considerable alteration, and is now divided into three places of worship, appropriated to three distinct parishes. There are three other Presbyterian churches of modern erection, one of them especially designed for the Highlanders of the town and its neighbourhood. There are sittings in these churches for above 6000 persons. In addition there are fourteen dissenting places of worship of various denominations, containing accommodation for nearly 9000 persons. A handsome building containing the county-hall, courts of justice, and other apartments for county business, of Grecian architecture, faces the Tay. Behind it is the new city and county gaol for felons, misdemeanants, and debtors. The other public buildings are those of the Academy, a neat theatre, a lunatic asylum (one of the most perfect establishments of the kind in Scotland), a range of barracks, and another of government storehouses, formerly used as a depôt for French prisoners; Marshall's monument (a building erected to commemorate the services of a late lord provost), containing the public library and the museum of the Perthshire Antiquarian Society; the gas-works, and the water-works. The range of barracks and storehouses is now in course of being converted into a prison, in which an improved system of discipline will be adopted, with a view to the reformation of the prisoners, and to the establishment of a model for other places of confinement for offenders. The market for flesh, vegetables, and butter is held near St. John's church; the fish-market on the bank of the river below the bridge. The council-hall for the town is near the fish-market.

The population of Perth, in 1831, was 20,016. The number of inhabited houses was 2049; of families, 4936; of whom only 53 were returned as engaged in agriculture. The ordinary population was estimated to be at least 1200 more than the Return, many of the wealthy being absent at sea-bathing places, and many of the poor engaged in field-labour or fishing; and the number of inhabitants has increased since the Return was made. The manufactures of the place consist principally of coloured cottons, especially for umbrellas. A great quantity of handkerchiefs, striped and checked ginghams, shawls, scarfs, and trimmings are also made. About 1500 persons are employed in weaving. A large flax and tow-yarn mill employs above 100 hands; a large bleaching and cotton-printing work at Tulloch, in the neighbourhood of Perth, employs 250; and there are other bleaching and print fields, besides three considerable iron-foundries, distilleries, breweries, and corn-mills. The salmon-fishery in the Tay is valuable. The chief imports are coal, lime, salt, and manure, brought coastwise; and from foreign parts (chiefly from the Baltic), timber, flax, linseed, clover-seed, corn, bark, hides, smalt, madder, &c. The exports are chiefly potatoes, sent to London, the value of which in Perth may be estimated at 65,000*l.* per annum; the value in London (freight and other charges being then included) above 100,000*l.*; the other articles of export are corn, timber, and slates. Nearly 90 vessels (with nearly 5500 aggregate tonnage) belong to Perth; no ship is registered at more than 100 tons, but vessels of twice that size have been built at Perth. Great exertions have been made within the last few years to improve the harbour. There are two weekly markets, the principal one on Friday, and there are five yearly fairs.

By the Burgh *Reform* Act (3 & 4 Will. IV., c. 76), the town was divided into four wards. The town-council consists of a lord provost (who is also sheriff and coroner), a dean of guild, four bailies, a treasurer, and twelve other councillors. A burgh court is held weekly, over which one of the bailies presides. The property of the burgh is estimated at nearly 70,000*l.*, the debts at nearly 20,000*l.* There are seven incorporated trades. Before the Parliamentary Reform Act, Perth returned one member in conjunction with Dundee, Forfar, Cupar of Fife, and St. Andrews. It now sends one by itself. The parliamentary bounds do not comprehend the whole area of the burgh. The police of the city is regulated by a local act, but it is imperfect. The justiciary court for the county and the sheriff's court for the division are held at Perth.

Perth has several educational and literary institutions. The 'academy' is an endowed institution, comprehending a mathematical and scientific school, a grammar school, a school of modern languages, two English schools, a writing school, and a drawing school. The reputation of the academy is very considerable. There were, in March, 1837, six other endowed schools, and twenty-two unendowed. The state of instruction among the poor however is very low; a local subscription was in consequence opened in 1834, and aided by grants from the lords of the Treasury and from the burgh authorities, for the purpose of erecting schools for city children. There are a public circulating library of from 5000 to 6000 volumes, a public news-room, and five private circulating libraries. There are four weekly news-papers printed in the town. A Literary and Antiquarian Society was established in 1784, which still flourishes, and has a collection of books, manuscripts, coins, objects of natural history, &c.

The charitable institutions include an hospital or almshouse, now disused and let, the rent being distributed in alms; an infirmary, capable of receiving above 20 patients; a dispensary, and several almsgiving societies. There are savings' banks and benefit societies. The poor are further relieved by a parochial assessment, by collections at the places of worship, and by gifts from the funds of the incorporated trades. The amount distributed in alms is very considerable, and the number of receivers tolerably large.

Culross is on the northern shore of the Frith of Forth, 23 miles from Edinburgh, and 6 from Dunfermline, in a detached part of the county. It had antiently an abbey of the Cistercian order. It was erected into a royal burgh by James VI. (James I. of England), A.D. 1588, at which time it was very prosperous, owing to some coal-works, the produce of which was exported to Holland. These works have been long discontinued. The manufacture of 'girdles' or iron plates, for baking oaten cakes, was formerly very flourishing, but is now discontinued. Culross has no market, and little trade is carried on. Dunfermline is the mart for the produce. About seventy persons are employed in weaving cotton or linen. There is a small pier for fishing and passage boats, which latter cross the Forth to Borrowstowness. The population of the parish, in 1831, was 1488, of whom less than half were in the town. The church, which antiently formed part of the conventual church of the abbey, is a cruciform building, with a massive western tower, in a commanding situation in the higher part of the town. There are some ruins of the former parish church in the parish burial-ground, which is still in use. The parish is well provided with the means of education, and there is a parish library of 200 volumes, another library, and a benefit society for funerals. The corporation was left untouched by the Scotch Burgh *Reform* Act (3 & 4 Will. IV., cap. 76). The council consists of 19 members, including a provost, two bailies, and a treasurer. The magistrates have rarely occasion to exercise their jurisdiction. The town-house is an old building, two rooms of which are appropriated as a prison, but seldom used. Culross unites with Inverkeithing, Dunfermline, Queensferry, and Stirling to return one member to parliament.

Auchterarder is described elsewhere. [AUCHTERARDER.] It was in this parish that the contest, now carried on in Scotland, between the civil and ecclesiastical courts, originated.

Abernethy is at the junction of the Earn with the Tay, 7 miles south-east of Perth. It was antiently the capital of the Picts, and the seat of a bishop, who was metropolitan, if not of all Scotland, at least of that part which was held by the Picts. The see was afterwards removed to St. Andrews, and the church was made collegiate. One relic of its Pictish greatness remains; a round tower 75 feet high and 48 feet in circumference at the base, but diminishing toward the top, built of hewn stone. The thickness of the wall is about 3½ feet. It serves as a belfry and clock tower to the church, which stands near and is a modern building. Abernethy is a dirty irregular place, with a population for the whole parish (which extends into Fifeshire) of 1776 inhabitants; the principal branch of industry is linen weaving.

Dumblane, or Dunblane, is on the road from Perth to Stirling and Glasgow, on the left bank of the Allan, over which there is a bridge. It was antiently one of the seats of the Culdees (a religious order diffused through Scotland and Ireland), and subsequently became the seat of a bishopric, which included parts of Perthshire and Stirlingshire. The town consists of a street of old-fashioned houses and a few lanes. The former cathedral, the choir of which is now used as the parish church, is a large Gothic building on an eminence. All parts, except the choir, are dilapidated, though in better preservation than most of the old ecclesiastical buildings of Scotland. A modern steeple, 128 feet high, has been erected adjacent to it. There is a dissenting meeting-house. The population in 1831 was 3228, above one-fourth agricultural. About 200 men are employed in manufactures. The court of the sheriff-substitute of the division is held here. The small town-house, comprehending two rooms, is used as prison. There is a weekly market, and there are four yearly cattle-fairs. A mineral spring about two miles distant attracts many visitors. There is a public library of 1400 volumes, the foundation of which was a bequest of books by the excellent Leighton (afterwards archbishop of Glasgow), who held for a time the see of Dunblane.

Dunkeld is on the left bank of the Tay, 15 miles north of Perth. It lies in a deep hollow under the brow of lofty wooded hills. The houses are generally old and of mean appearance; and there are no manufactures, except of leather and linen. The town derives benefit from visitors, who are attracted to it by the beauty of its situation and its convenience as the point of entrance upon the Highlands. There was an antient monastery of Culdees here, and in 1127 it was made the seat of a bishopric, which in the early part of the sixteenth century was held by Gawin Douglas. The cathedral, which was partly of Norman, partly of later architecture, is in ruins, except the choir, which serves as the parish church. There is a fine bridge of seven arches over the Tay, and near the town is a seat with beautiful grounds belonging to the Duke of Athol. There is a weekly market, and there are several yearly fairs. The population in 1831 was 1471. Dunkeld is a burgh of barony, of which the Duke of Athol is superior.

Crieff is beautifully situated near the north or left bank of the Earn, 17 miles west of Perth. It was burned by the Highlanders in 1715, and was only saved in 1745 from a similar fate by the interference of the Duke of Perth. The town is thriving. There are two modern churches; that of latest erection is in a commanding situation, and is the finest building in the town. There are three places of worship for Seceders and one for Catholics. There are a nu-sons' hall and a weavers' hall. The population of the parish in 1831 was 4786; of whom about four-fifths were in the town. There are nearly 500 handloom weavers, who make cotton-checks and handkerchiefs, linens and worsted stuffs, blankets, plaids, and shawls. There are tan-yards, flour-mills, malthouses, distilleries, two cotton-mills, an oil and a paper mill, and bleach-fields. Tambour-working and other similar occupations are pursued by the females. There are quarries of inferior sandstone in the neighbourhood. There are a weekly market and nine yearly fairs. Crieff is a burgh of barony; a justice of the peace court (or petty session) is held every month for small debts and minor offences; there is also a committee to manage the affairs of the town, but the police is very deficient; and petty thefts, assaults, and other similar offences are frequent. There is a prison, or lock-up-house of one cell. There are fifteen schools, four of them Sunday-evening schools, and a Sunday-evening class for the religious instruction of young men and women.

Longforgan is a long straggling place, 18 miles from Perth on the road to Dundee. It had a population in 1831 of 1638 for the whole parish; of whom about 150 (men and women) were engaged in weaving sheeting, sacking, and linens, and about 50 women and children in winding or otherwise preparing the yarns for the loom. There are quarries of excellent freestone in the parish, in which about 60 men are employed. There are a large church, six schools, a library, and a savings' bank. There are three yearly fairs. Near the town are the ruins of an antient chapel belonging to the Cistertian monastery of Cupar Angus, and the noble baronial seat of Castle Huntly.

Cupar of Angus is partly in Forfarshire, but chiefly in Perthshire near the right bank of the Isla. Near the town are the traces of a Roman camp and the ruins of a rich monastery. The town is neatly built, with clean and well lighted streets; there are a church, an Episcopal chapel, two Dissenting Presbyterian meeting-houses, a town-house, and small gaol, or lock-up-house of one cell. Linen-weaving, tanning, and bleaching are carried on; there are a weekly market and four or five yearly fairs. The population in 1831 was 2615. Alyth is described elsewhere. [ALYTH.] Auchtergaven had in 1831 a population of 3417, a great number of whom were employed in the cotton-works at Stanley, a village on the Tay, partly in this parish. There are quarries of freestone in the parish and a small salmon-fishery. Malting, distilling, and linen-weaving are carried on. There is a parish church, besides a handsome chapel-of-ease, erected by the proprietors of the Stanley cotton-works; a school is also maintained by them. A yearly fair is held at Auchtergaven. Blairgowrie is described elsewhere. [BLAIRGOWRIE.] Callander, on the Teith at the junction of the stream from Loch Lubnaig, consists of a wide and clean street, with substantial freestone houses roofed with slate. The population of the parish, which is very large, was, in 1831, 1909. The village is resorted to by visitors to Loch Catrine and the romantic scenery around. There are a parish church, several inns, three schools, and three libraries. There are several fairs in the year.

Errol is a small and mean place, but in a beautiful situation near the Frith of Tay. The church is a modern cruciform building in the Norman style, with a lofty square tower and pinnacles. The population of the parish in 1831 was 2992, about two-fifths of them resident in the village. Stone-quarries are worked, and salmon and smelt fisheries carried on; but the linen-manufacture is the chief branch of industry: it employs 200 men and 100 women as weavers, beside winders and other assistants. Doune, on the banks of the Teith, eight miles from Stirling, is remarkable for a handsome Gothic church and tower, of modern erection; a fine old bridge over the Teith; and the ruins of Doune Castle, an antient fortress of great strength and extent. There are extensive cotton-works at Deanston, close to the village, and several cattle-fairs are held in the course of the year. Doune is in Kilmadock parish, the population of which in 1831 was 3752. Bridge-end of Kinnoul is a suburb of Perth. Methven is a manufacturing village, a few miles west of Perth (pop. of parish, in 1831, 2714) with a commodious parish church, three good schools, a library of 1100 volumes, a friendly or benefit society, and a savings' bank. Muthill is a clean village, beautifully situated in Strathearn, a short distance from Crieff southward, with a population of 1100 or 1200 (or for the whole parish, in 1831, of 3297). There are a parish church at Nuthill, and a chapel-of-ease at Ardoch; an Episcopalian chapel, a Secession meeting-house, nine schools, a library and reading-rooms, at Nuthill; another library at Braco village near Ardoch, and a library for ministers and students at Innerpeffary, all in the parish; a savings' bank, and a Bible and Missionary Society. There are three considerable distilleries, which make yearly 100,000 gallons of whiskey. Scone, near the right bank of the Tay, rather more than a mile north of Perth, is memorable for its palace, the antient residence of the Scottish kings and the place of their coronation. It had also an abbey of the regular canons of St. Augustin. The palace and the abbey (except one aisle) have both disappeared: a modern house, the seat of the earl of Mansfield, occupies the site of the former. The village of Scone is neat and regularly built. Population of the parish in 1831, 2268. Kincardine is a thriving port on the Tay, with a good quay and harbour. There are sail-lofts and rope-walks, and brewing and distilling are carried on. Many of the traders are shipowners, and several vessels have been built. There were formerly salt-pans near the town, but they have been given up. There is a yearly fair. The parish church is at Tulliallan, near Kincardine, but there is a Dissenting meeting-house in the town. Population of the parish in 1831, 3550.

Industry.—The cotton-manufacture has been already noticed. Several towns and villages participate in the linen manufacture, of which Dundee is the centre. Wo[illegible] and some silks are also woven, the latter at Perth. From 3000 to 3500 men were employed as weavers in these branches in 1831, beside females and children, who (in the cotton-works especially) are very numerous. Above [illegible] men are employed in other branches of these manufactures, spinning, bleaching, printing, &c., or in other manufactures. From 250 to 300 men are employed in stone, lime, and slate quarries; 50 or more in coal-pits, chiefly in Tull[illegible] and Fossoway parishes, on the Fifeshire border; and [illegible] men in an ironstone-mine, also in Fossoway parish. The salmon fishery on the Tay employs 100 men or more, and several men are engaged in the distillation of whiskey at different places.

Ecclesiastical, Legal, and Parliamentary Arrangements.—The number of parishes wholly or partly in this county was in 1818, 80 (see Playfair's *Description of Scotland*); but some of these have been subsequently divided for ecclesiastical purposes: the present number is probably nearly [illegible]. They are included in the presbyteries of Perth, Dunblane, Dunkeld, Auchterarder, Meigle, Dundee, and Dunfermline. The presbyteries of Perth, Auchterarder, Dunkeld, and Dunblane, are in the synod of Perth; those of Meigle and Dundee, in the synod of Angus and Mearns; that of Dunfermline in the synod of Fife. In antient times the county was chiefly if not wholly included in the dioceses of Dunblane and Dunkeld.

The county is divided into two districts, each under a sheriff substitute; and is subdivided into ten smaller districts, each under the jurisdiction of a justice of the peace court. There are eight prisons, two at Perth (one of them a small house of correction), and one each at Blairgowrie, Dunblane, Crieff, Dunkeld, Kincardine, and Culross; several of these are very small and bad. Crime is not frequent in the county, and is rather decreasing. The most frequent offences are assaults, chiefly made under the excitement of spirituous liquors. Drunkenness is believed to have increased. The police is very good at Perth, and tolerable in other parts of the county. Mendicants are numerous, but they are chiefly vagrants. Education is much improved, and is now tolerably general in the rural districts; but the means of instruction are very deficiently supplied at Perth, though steps have been lately taken to supply the deficiency. (*Inspectors of Prisons' Second Report*, 1837.) The greatest number of scholars of all classes at the daily schools in Perthshire between Michaelmas, [illegible], and Ladyday, 1834, was estimated at 18,862. (*Education Returns, Scotland*, 1834.)

The county returns one member to parliament; but the parishes of Tulliallan, Culross, Muckhart, Logie, and Fossoway have been annexed for parliamentary purposes to the shires of Kinross and Clackmannan, which in conjunction return one member. Perth returns one member for itself; and Culross unites with Inverkeithing, Dunfermline, Queensferry, and Stirling, to return another.

Historical Events; Antiquities.—In the obscurity that hangs over the geography of antient Caledonia, little that is certain can be advanced as to the earliest inhabitants of Perthshire. The eastern side was occupied by the [illegible] nicones (Οὐενίκωνες) of Ptolemy, whom we may probably regard as identical with the Vecturiones or Venturiones of Richard, and the Vecturiones of Ammianus Marcellinus. Both Ptolemy and Richard agree in assigning to this people the town Orrea (Ὄρρεα), which is supposed to have been at the junction of the Tay and the Almond, or perhaps on the opposite (eastern) bank of the river. There are slight traces of a station at the junction of the Almond and Tay, though in great measure destroyed by a variation in the channel of the Almond; and there are traces of a camp at Grassy Walls, on the opposite side of the river, a little farther to the northward. The country south of the Tay was inhabited first by the Damnii, afterwards by the Horestii, or Horesti, who are mentioned by Tacitus. (*Agric.*, c. 38.) The highlands of Perthshire were probably occupied by the Damnii Albani, 'a people little known,' says Richard, 'being wholly secluded among lakes and mountains.'

The Tay, under the form Tavus, is mentioned by Tacitus (*Agric.*, c. 22), by Ptolemy, who writes it Ταοῦα, and by Richard. The Earn appears in Richard under the name of Hierna. If we may trust the authority of the last, the whole county, except perhaps the western boundary, was comprehended in what was termed the province of Vespasiana, over which the Romans possessed only a very brief and precarious sway.

A Roman road crossed the western side of the county from the neighbourhood of Stirling to Orrea, near Perth, at or near which it probably divided into two branches, one directed toward the coast, the other crossing the Grampians (the Grampius Mons of the Roman historians and geographers), towards the shore of Murray Frith. There were several Roman stations in Perthshire. Alauna (Ἀλαῦνα) was probably at Kier, just within the county, near Stirling. The name appears to be equivalent to the Welsh 'Caer,' which usually marks a Roman post or town. The next station was Lindum (Λίνδον), now Ardoch, in Strathallan, one of the strongest and most perfect Roman works in the island. [ARDOCH.] Next to this was Victoria, probably Dealgin Ross, in Strathearn, where are some remains of Roman works, apparently never completed. This station was established and named by Agricola to commemorate his great victory over the Caledonians under Galgacus. The next station was Ad Hiernam, which may be fixed at Strageath, on the Earn, or Hierna. There are the remains of a Roman post, which has evidently been of great strength. Orrea has been noticed. The position of the Ad Tavum of Richard is disputed. Mr. Hatchard, in his edition of Richard, places it at Invergowrie, on the Tay, just above Dundee, in Forfarshire; General Roy, at Burgh Tay, below Dundee; and the Map of Antient Britain, published by the Society for the Diffusion of Useful Knowledge, in the neighbourhood of Perth. There are the remains of a Roman camp at Invergowrie. Ad Tavum was on the road from Orrea to the coast. The In Medio of Richard was probably at Inchtuthill, on the Tay, above the junction of the Isla, where are some remarkable Roman works, or perhaps at Cupar Angus. There are the remains of a Roman camp at Fortingale, in Glen Lyon. The prætorium is still complete. There are the piers of a bridge over the Tay, close to the junction of the Almond, where the situation of Orrea may be fixed.

Alauna, Lindum, and Victoria, according to Ptolemy, belonged to the Damnii, who inhabited for the most part within the ramparts of Agricola and Antoninus. They appear to have withdrawn from that part of the territory which lay beyond the rampart, and which was subsequently appropriated by the Horestii, who came from Fifeshire.

This county was the scene of hostility perhaps in the third campaign of Agricola (A.D. 80), at any rate in the sixth and seventh (A.D. 83, 84). The attack made by the Caledonians on the camp of the ninth legion, in the sixth campaign, was probably at Dealgin Ross. Severus must have crossed Perthshire in his war against the Caledonians (A.D. 206, 207).

There are some remains of a large Druidical circle and several antient circular forts in the Highland parish of Fortingale, or Fortingal. The age and origin of the forts is not known. Remains of circles, cairns, and other Druidical remains are found in the parishes of Kirk-Michael, Blair Athol, Cargill, &c. There is a remarkable fort, partially vitrified, at Alyth.

At the downfal of the Roman empire, Perthshire was occupied by the Picts, who had Abernethy for their capital; it afterwards came into the hands of the Scots. In the latter part of the tenth century, the Danes arrived at the mouth of the Esk with a large fleet, and landing, marched to the Tay. They were entirely routed by the Scottish king, Kenneth III., at Luncarty, near Perth, probably in A.D. 990. Dunsinnan or Dunsinane Hill, in Collace parish, between Perth and Cupar Angus, was the stronghold of Macbeth, where he was defeated by the English allies of his competitor Malcolm (A.D. 1054). The importance of Perth, and its rank as capital of the kingdom, made this shire the scene of many contests. In 1306 Robert Bruce was defeated at Methven, near Perth, by Aymer de Valence, earl of Pembroke, and the English army. In 1332 Edward Baliol, competitor of the minor King David Bruce, at the head of an invading force, chiefly of English, defeated the Scots under the regent, the earl of Mar, at Dupplin Moor, on the Earn. He took Perth, where he maintained himself for some time, until his party was finally crushed by the partisans of David Bruce.

In the campaign of Montrose (A.D. 1644) this county was the earliest scene of action. At the head of 1100 ill-armed Irish foot and 1300 Highlanders, Montrose defeated 5000 Covenanters, under Lord Elcho, at Tippermuir near Perth, with the loss to them of 2000 killed. The Scottish parliament, which supported the claim of Charles II. to the crown, assembled in 1650 at Perth; and on new-year's day, 1651, Charles II. was crowned with great solemnity at Scone. In the same year Perth was taken by Cromwell, and the royalist party crushed.

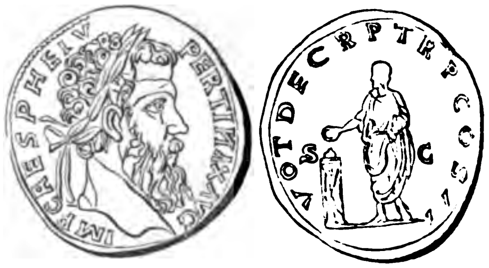
In the struggle at the Revolution, A.D. 1689, Perth was taken by surprise by Viscount Dundee, but he soon abandoned the town and retired into the Highlands. On the 17th of July, at the head of about 2200 men, including 300 Irish, he defeated a more numerous government army under General Mackay, with the loss of 2000 men; but the death of Dundee, who fell early in the action, prevented any beneficial result of the victory. The Highlanders were repulsed in an attack on Dunkeld, where a Cameronian regiment was posted, and soon afterwards dispersed; and the war came to an end. In the rebellion of 1715-16, a battle was fought on Sheriff Muir, near Dunblane, between the Highlanders, to the number of 10,000, under the earl of Mar, and 4000 government troops, under the duke of Argyle. The battle was drawn; but the government reaped from it the advantage of victory. The Pretender was for a short time at Scone during the insurrection. In the second Jacobite rebellion, the young Pretender was at Perth in 1745, and the duke of Cumberland in 1746. A body of government troops was blockaded in the castle of Blair-Athol by the insurgents under Lord George Murray (March and April, 1746), and relieved, when reduced to extremity, by a royalist detachment from Dunkeld.

The antiquities of the county consist chiefly of the remains of Dunblane and Dunkeld cathedrals; some other scanty ecclesiastical remains; some ruins of antient castles at Moulin, Doune, Kincardine, Kincleven, and Drummond Castle near Muthil; and some hill forts, cairns, and Druidical stones. Blair-Athol Castle has been modernised, and is the present seat of the duke of Athol.

(*New Statistical Account of Scotland*; *Playfair's Description of Scotland*; Chambers's *Gazetteer of Scotland*; Sir W. Scott's *History of Scotland*, in *Lardner's Cyclopædia*; *Parliamentary Papers*.)

PE'RTINAX, PU'BLIUS HE'LVIUS, born about A.D. 126, at Villa Martis, near Alba Pompeia, now Alba in Piedmont, on the banks of the Tanarus, was the son of a freedman who dealt in charcoal, an important article of fuel in Italy even at the present day. His father gave him a good education, placing him under the tuition of Sulpicius Apollinaris, a celebrated grammarian, who is repeatedly quoted by Aulus Gellius. Pertinax became a proficient in the Greek and Roman languages; and after the death of his master, he taught grammar himself. But being dissatisfied with the small profits of his profession, he entered the army; and being assisted by the interest of Lollianus Avitus, a man of a consular family and his father's patronus, he was promoted to a command. He was sent to Syria at the head of a cohort, and served with distinction against the Parthians, under L. Verus, the colleague of Marcus Aurelius. He was afterwards sent to Britain, where he remained for some time. Subsequently he served in Mœsia, Germany, and Dacia; but upon some suspicion of his fidelity, he was recalled by Marcus Aurelius. Having cleared himself, he was made prætor and commander of the first legion, and obtained the rank of senator. Being sent to Rhætia and Noricum, he drove away the hostile German tribes. His next promotion was to the consulate, and he publicly received the praise of Marcus in the senate and in the camp for his distinguished services. In Syria he assisted in repressing the revolt of Avitus Cassius. He was next removed to the command of the legions on the Danube, and was made governor of Mœsia and Dacia, and afterwards returned to Syria as governor, where he remained till the death of Marcus. Capitolinus says that his conduct was irreprehensible till the time of his Syrian government, when he enriched himself, and his conduct became the subject of popular censure. On his return to Rome, he was banished by Perennis, the favourite of Commodus, to his native country, Liguria. Here he adorned Villa Martis with sumptuous buildings, in the midst of which however he left his humble paternal cottage untouched. He remained three years in Liguria. After the death of Perennis, Commodus commissioned him to proceed to Britain, where the licentiousness of the troops had degenerated into mutiny. On his arrival, the soldiers wished to salute him emperor, and were with difficulty prevented by Pertinax, who seems to have found the discipline of the legions in that remote part of the empire in a most deplorable state. One of the legions revolted against him; and in trying to repress it, he was wounded, and left among the dead. On his recovery, he punished the mutineers, and solicited the emperor for his recall, as his attempts at restoring discipline had rendered him obnoxious to the army. He was then sent proconsul to Africa, and was afterwards made præfect of Rome, in which office he showed much temperance and humanity. After the murder of Commodus, two of the conspirators, Lætus and Electus, went to Pertinax and offered him the empire, which Pertinax at first refused, but afterwards accepted, and was proclaimed emperor by the senate in the night previous to the first of January, A.D. 193. In the speech which Pertinax delivered on the occasion, he said something complimentary to Lætus, to whom he owed the empire, on which Q. Sosius Falco, one of the two consuls, observed, that it was easy to foresee what kind of an emperor he would make, if he allowed the ministers of the atrocities of Commodus to retain their places. Pertinax mildly replied, 'You are but a young consul, and do not yet know the necessity of forgiving. These men have obeyed the orders of their master Commodus, but they did it reluctantly, as they have shown whenever they had an opportunity.' He then repaired to the imperial palace, where he gave a banquet to the magistrates and principal senators, according to the antient custom. The historian Dion Cassius was among the guests. Pertinax recalled those who had been exiled for treason under Commodus, and cleared from obloquy the memory of those who had been unjustly put to death. But his attempts to restore discipline in the army alienated the affections of the soldiers, who had been accustomed to licence under the reign of Commodus. As he found the treasury empty, he sold the statues, the plate, and all the valuable objects amassed by Commodus, and even his concubines. By this means he collected money to pay the Prætorians, and to make the usual gifts to the people of Rome. He publicly declared that he would receive no legacies or inheritance from any one, and he took away several taxes and tolls which had been imposed by Commodus. Pertinax was cherished by the senate and the people; but the turbulent Prætorians, secretly encouraged by the traitor Lætus, conspired against the new emperor. After offering the empire to several persons, they went to the palace, three hundred in number. The friends of Pertinax urged him to conceal himself till the storm had passed; but the emperor said that such conduct would be unworthy of his rank; and he appeared before the mutineers, and calmly remonstrated with them upon the guilt of their attempt. He was making an impression upon them, when one of the soldiers, a German by birth, threw his spear at him and wounded him in the breast. Pertinax then covered his face, and, praying the gods to avenge his murder, was finished by the other soldiers. Electus alone defended him as long as he could, and was killed with him. The soldiers cut off the head of Pertinax and carried it into their camp, and then put the empire to auction, offering it to the highest bidder. [DIDIUS, JULIANUS.] Pertinax was sixty-seven years of age, and had reigned eighty-seven days.

(Capitolinus, in *Historia Augusta;* Dion Cassius., b. 73.)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Coin of Pertinax.
British Museum. Actual Size.

PERTURBATIONS. [GRAVITATION.]
PERTUSSIS. [HOOPING-COUGH.]

END OF VOLUME THE SEVENTEENTH.

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